

ماجستیر تناسلیه (4)

ANATOMY OF MALE

(Genital system)

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— just print —

01025329200- 0502200362

# Male Genital System anatomy:

① P. 1

① Int. Genital System → See infestibly

② Ext. Genital System

## Anatomy of Penis

③ Coverings: <sup>of the penis</sup>

- Skin
- Darts Fascia
- Buck's Fascia
- Tunica Albuginea
- Arector Layer of Smith

④ Structure: <sup>Cavernosa</sup> Corporae <sup>Spongiosum</sup>

⑤ Ligaments & Muscles

⑥ Blood supply, venous & Lymphatic drainage, Nerve supply.

### A. Coverings

① Skin

- loosely attached to underlying Fascia
- Contain <sup>Sebaceous</sup> glands
- (25) <sup>Sweat</sup>
- don't contain <sup>S.C.T</sup>
- <sup>Hair</sup> (Partially Free)
- show 2 folds <sup>Prepuce</sup>
- <sup>Frenulum</sup>

② Dartos (Collis)

Fold

- Def. → Superficial Fascia
- <sup>thin</sup> of Penis
- loosely attached to underlying Buck's

• Extension: To be Connected to Fascia of scrotum.

• derived from "Scars" Fascia of Ant. Abd. Wall.

③ Buck's Fascia

- <sup>deep</sup> Fascia
- <sup>Thick & Firm</sup>
- attached to T. Albuginea.
- Ext. to base of penis.

Prepuce  
Frenulum

Dartos

#### ④ Tunica Albuginea:

Strong Tough Fibrous Layer That encloses each corpora.

Composite → Collagen  
(alternating <sup>inner</sup> circular & outer longitudinal layer).

It  $\left\{ \begin{array}{l} \text{Fuse: at middle line} \rightarrow \text{Septum} \\ \text{Separate:} \end{array} \right.$   
proximally to ~~corpora~~ crurae

Thinning = lack of outer longitudinal layer: occurs at 6 o'clock to prevent E.S. allow ejaculate compression.  
3, 9 o'clock → most areas of fracture.

But it Allows Free Passage of Blood Bet. The 2 units (so they form one vascular space).

also may be injured at these sites during penile prosthesis.

#### ⑤ Areolar layer of Smith: (space)

Thin layer of <sup>areolar</sup> C.T That Separates The Tunica Albuginea from underlying cavernous tissue.



long layer

② Structure of The penis:

③ parallel Longitudinal Cylinders

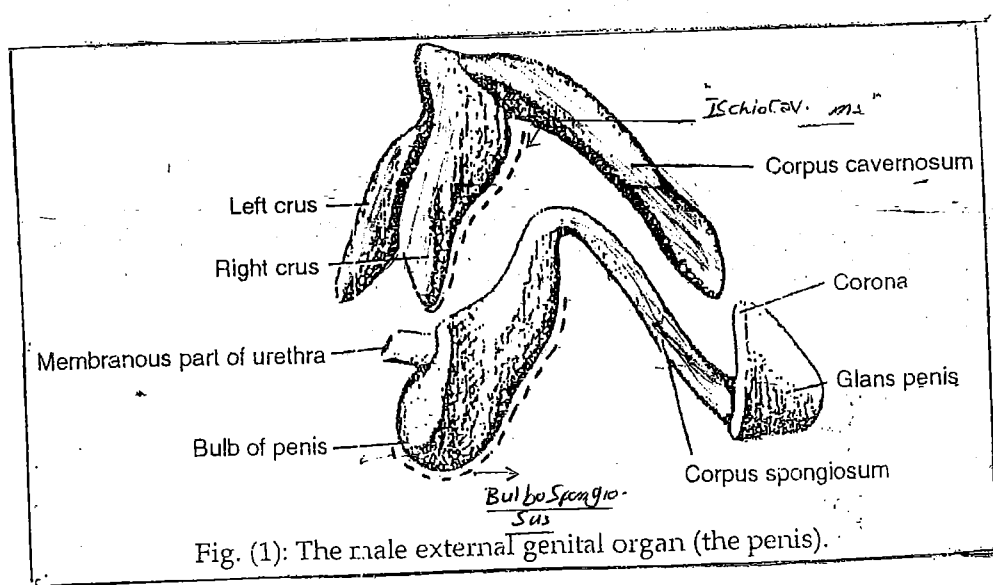
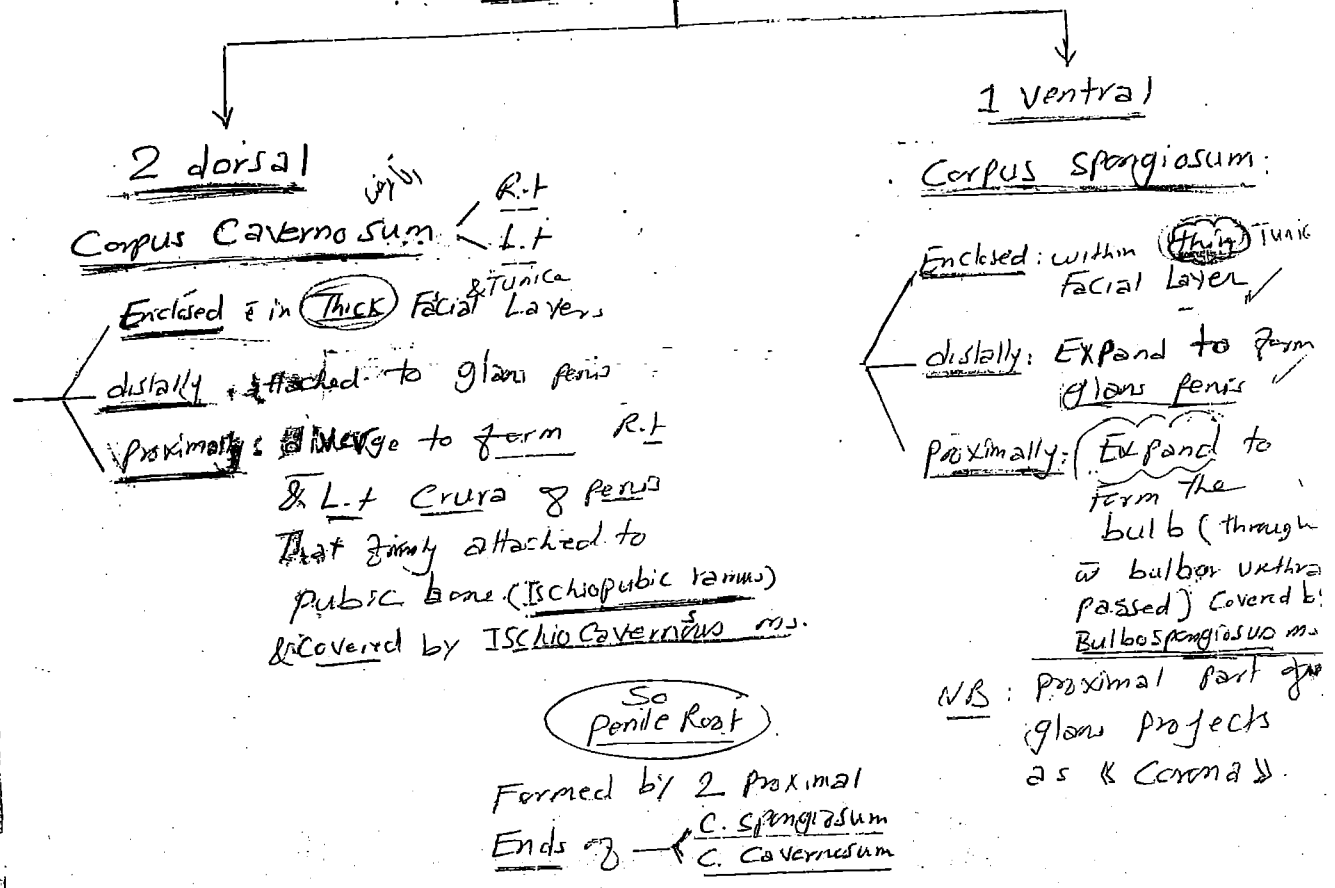
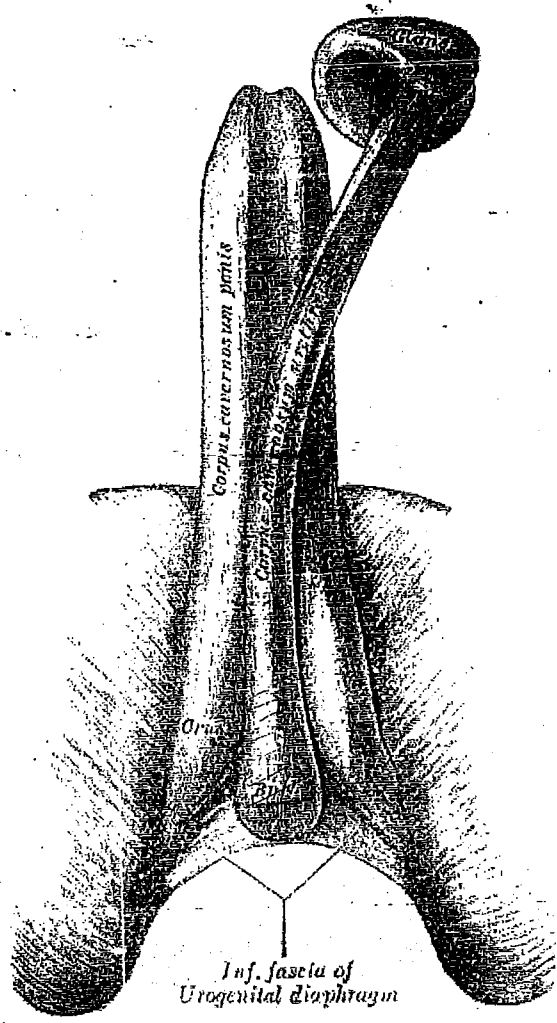
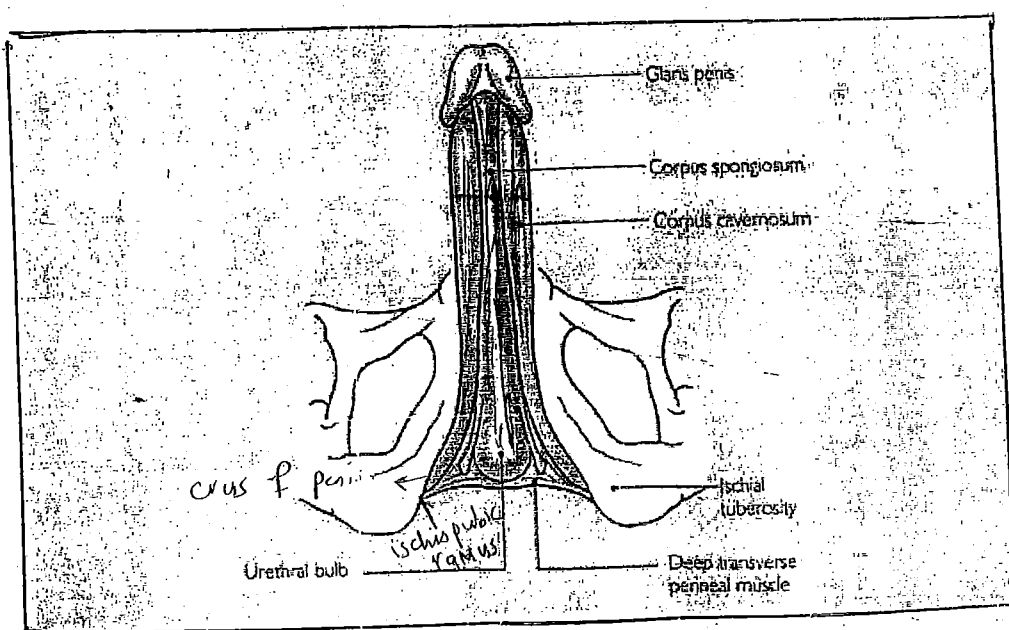


Fig. (1): The male external genital organ (the penis).



see - corpus  
- spongiosum



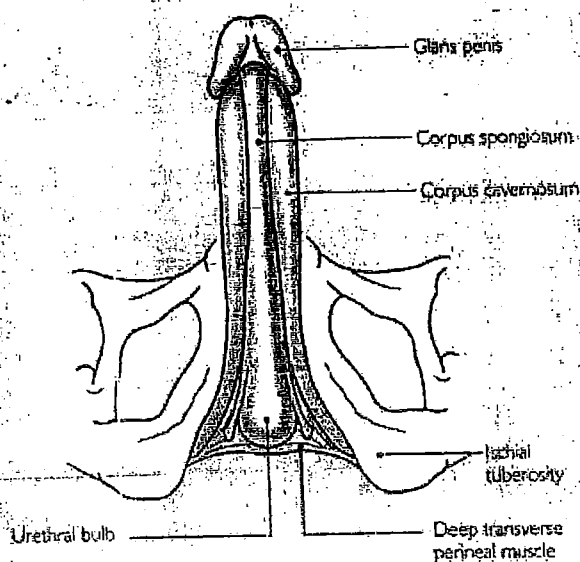


Figure 1 Key structures mediating erection are the corpora cavernosa or 'erectile bodies', which are fused distally for approximately three-quarters of their length. They separate proximally to fuse with each ischial tuberosity of the pelvis. On their ventral surface lies the corpus spongiosum, which surrounds the urethra

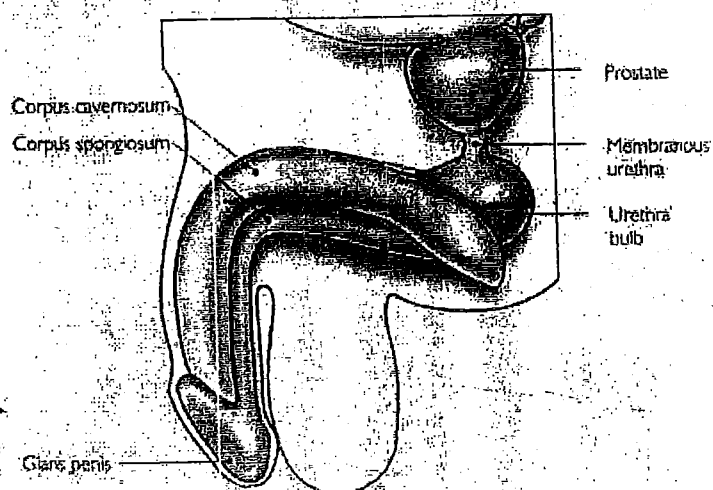


Figure 3 The corpus spongiosum is firmly attached to the undersurface (ventral aspect) of the corpora cavernosa and expands distally to form the glans penis. Proximally, it forms the urethral bulb, where the urethra curves cranially to form the sphincter-active membranous urethra

## Cavernous Tissue

Sponge like (سفنجي) Tissue formed of: <sup>spaces</sup> <sub>walls</sub>

1. Cavernous Spaces (sinusoids) - That's lined with Endothelium.

2. Walls (Trabeculae) Composed of:

- (i) Endothelium
- (ii) smooth ms. (5%)
- (iii) Frame Network of Collagen & Elastic.
- (iv) BVS.

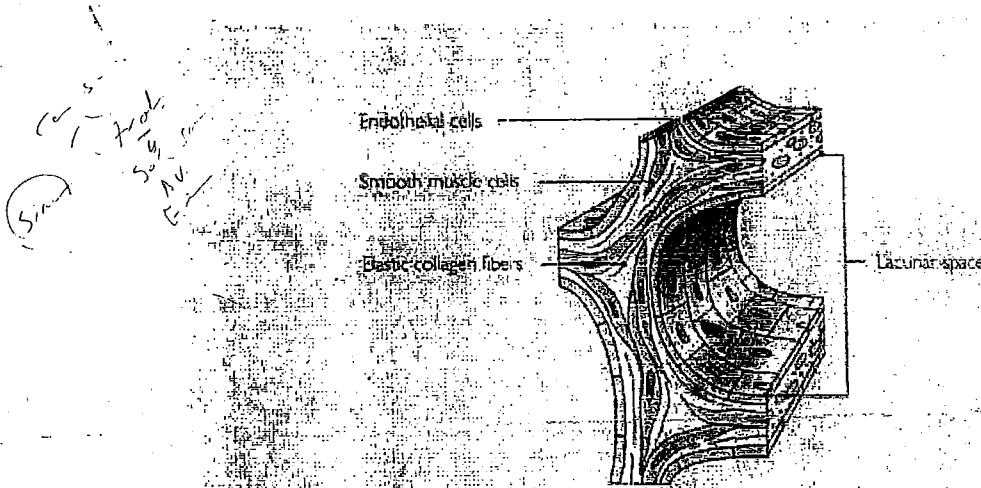


Figure 23 Smooth muscle architecture and vascular endothelium of the walls of the lacunar spaces within the corpora. Relaxation of these smooth muscle cells is an important component of the erectile mechanism

NB: C- Spongiosum is a Cavernous Tissue but differs

From C. Cavernosa in:

1. Thin Tunica & Fascia.
2. Less smooth ms.
3. Smaller Sinusoids.
4. Lower pressure < C.C.

## Clinically Important points

(7) P.7

### 1. Penile Erection depends on:

Relaxation A. Relaxation of: smooth muscles of cavernous arteries & spaces  $\rightarrow$  Filling of spaces by Blood  $\rightarrow$   $\uparrow$  penile size.

Compression B. Compression of: sub-tunical veins & emissary veins bet. Tunica & the cavernous tissue  $\rightarrow$   $\uparrow$  penile rigidity.

2. 3 Factors

Thin Fascia	}	of C. Spongiosum as compared to C. Cavernosum.
Thin Tunica		
lower pressure		

$\rightarrow$  prevention of pressure on urethra during Erection  $\rightarrow$  remains patent for passage of Semen.

3. Rigidity of penis: depend mainly on 2 Corpora Cavernosa rather than C. Spongiosum.

penile  
part of  
filler  
pressure  
sub-tunical



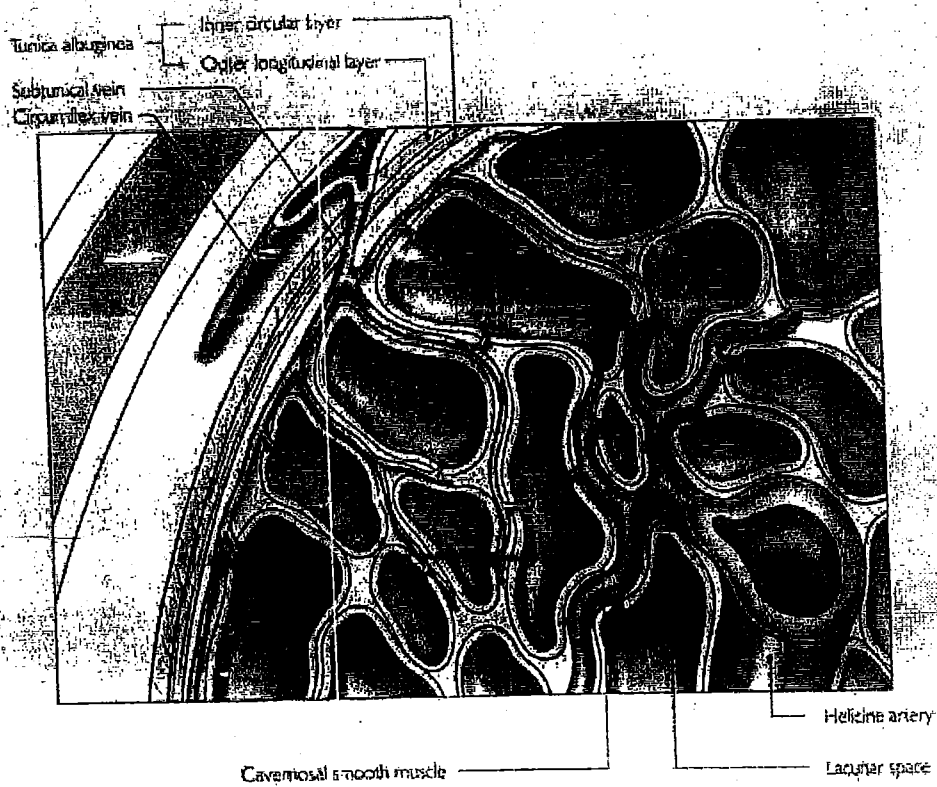
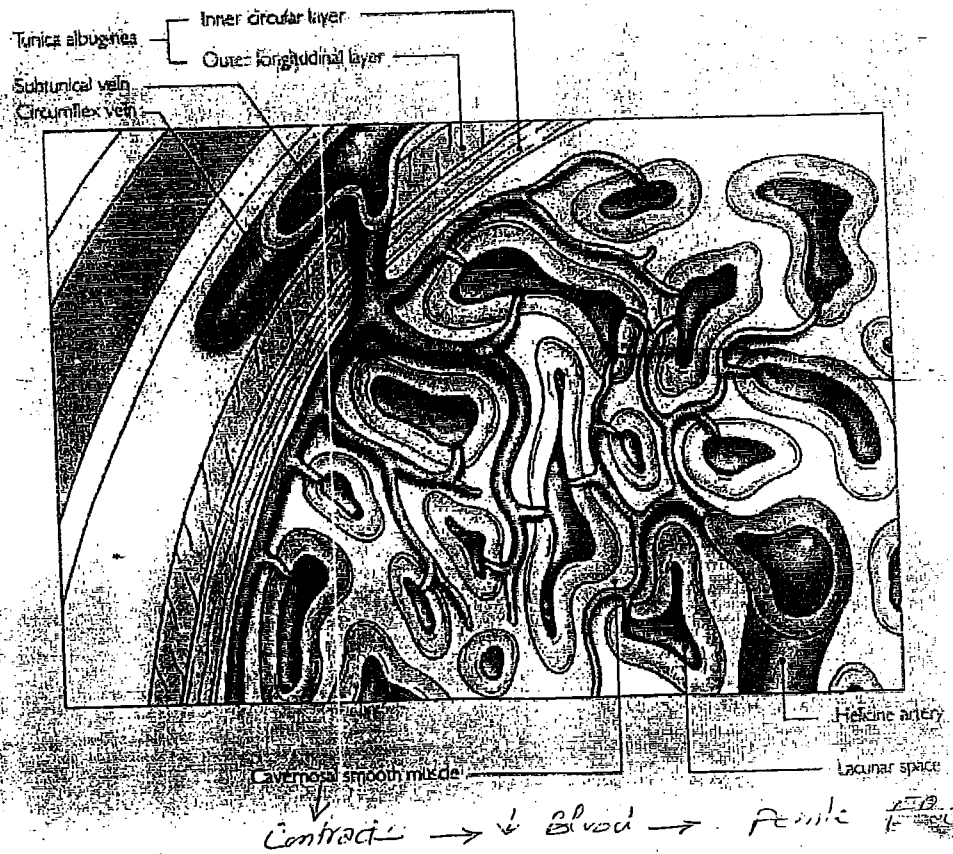


Figure 24 Hemodynamics of flaccidity. (a) Tonic contraction of the walls of the helicine arteries and trabeculae allows only relatively small amounts of blood into the lacunar spaces. Whatever blood is entering is drained



## Ligaments of Penis

ant abd wall →  
dartos fascia  
→ scrotum.  
→ Fundiform  
Ligament

Suspensory Ligament

Arises from → SP →  
passed deeply & inserted  
into deep fascia of  
penis.

Arise from: Facia of Ant.

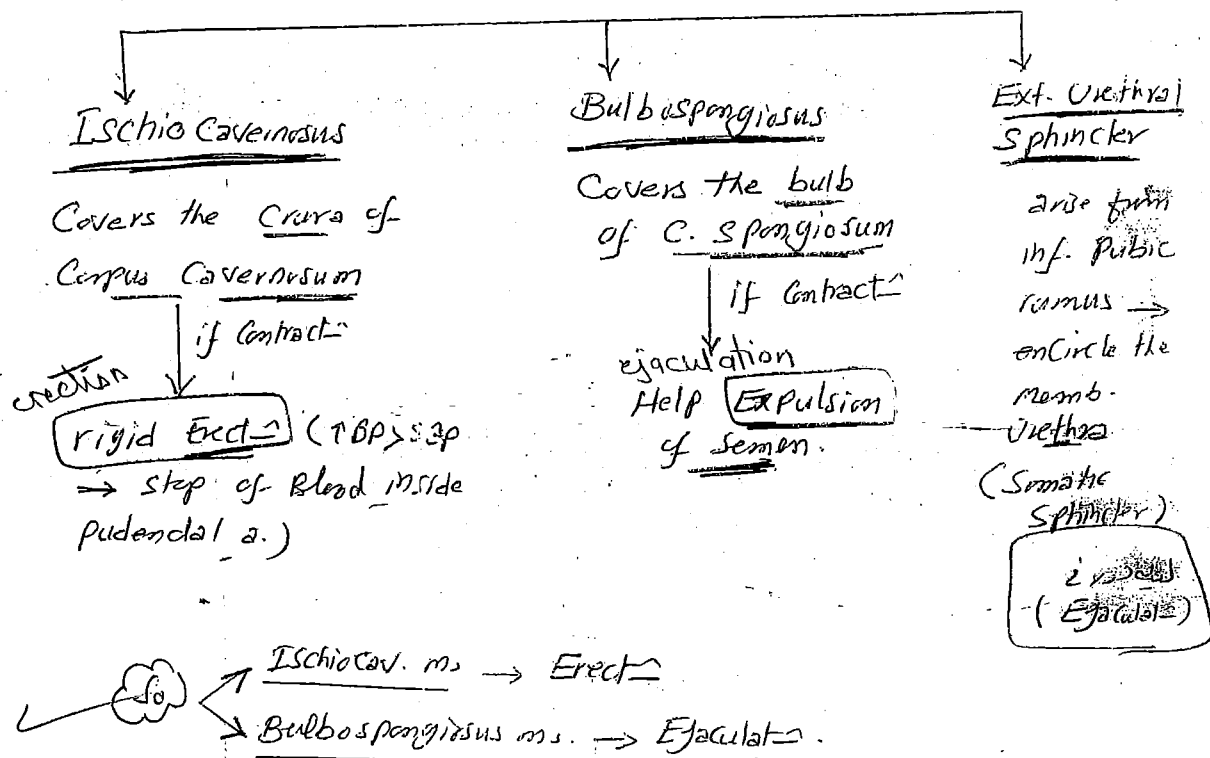
Abd. wall → pass. superficially  
& inserted into sides of  
Dartos Fascia & Fuse again  
inferior to penis as a part  
of the scrotal septum.

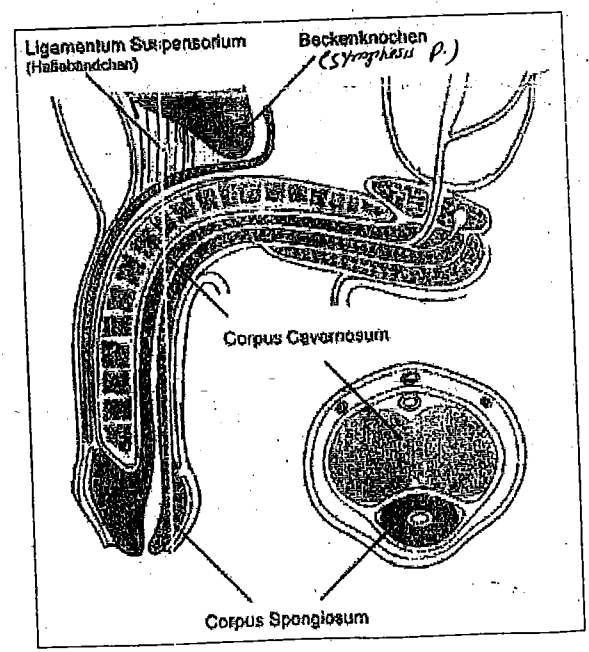
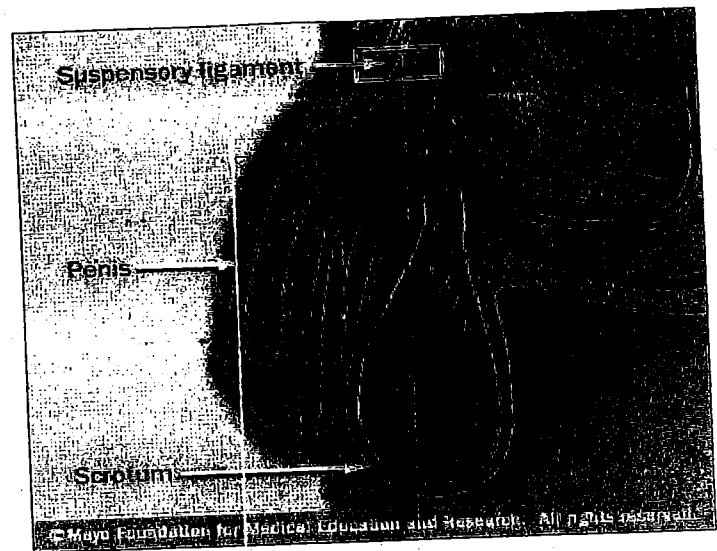
SP → Buck's fascia

base of penis

## Muscles of the penis

(3)





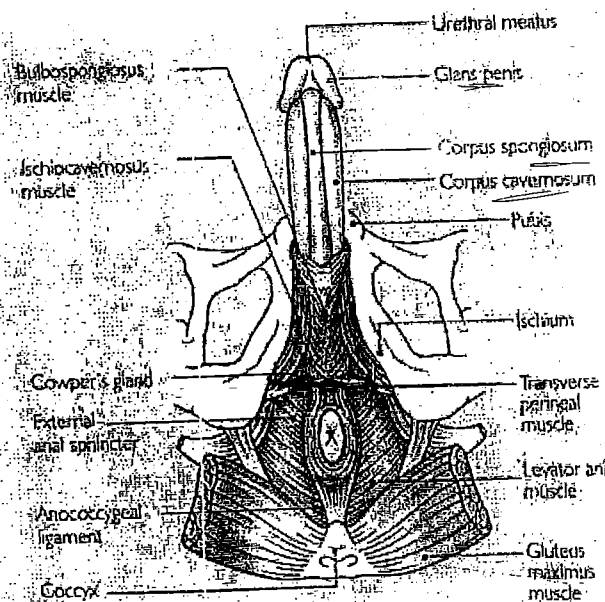
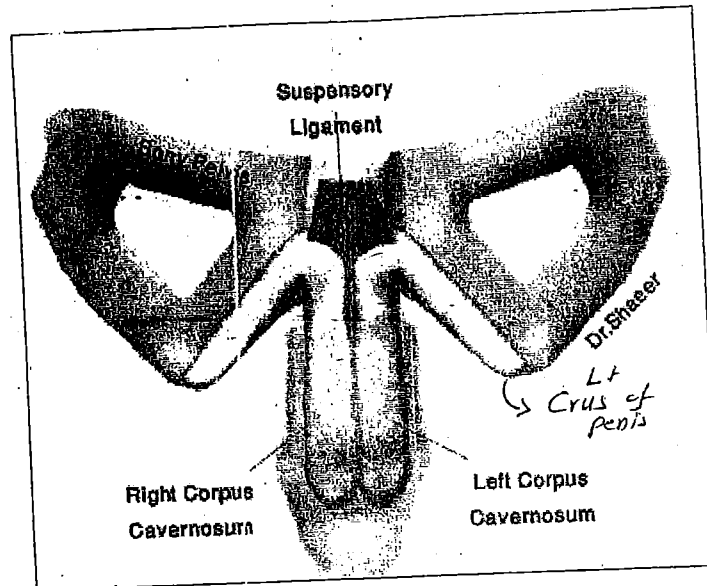
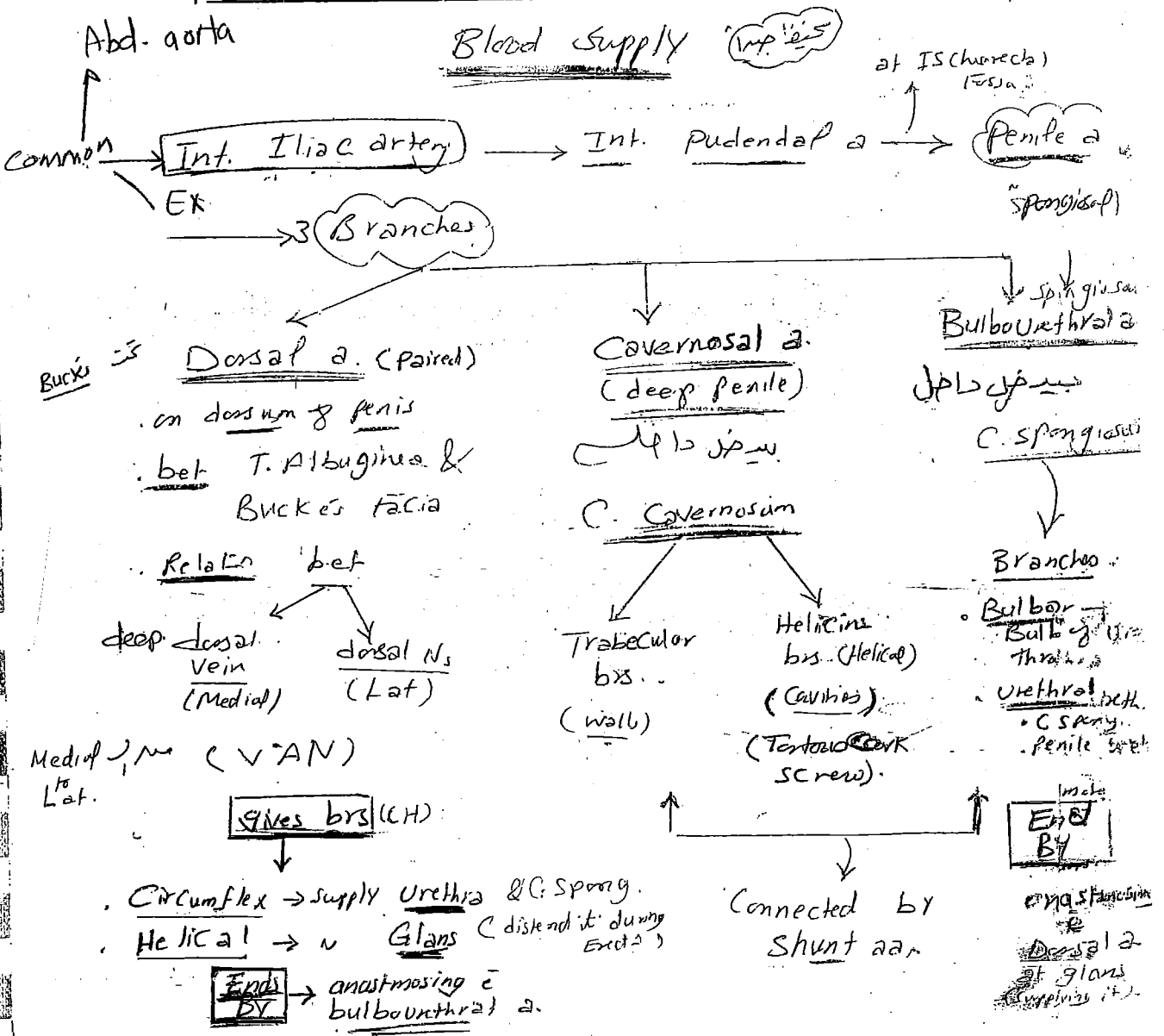
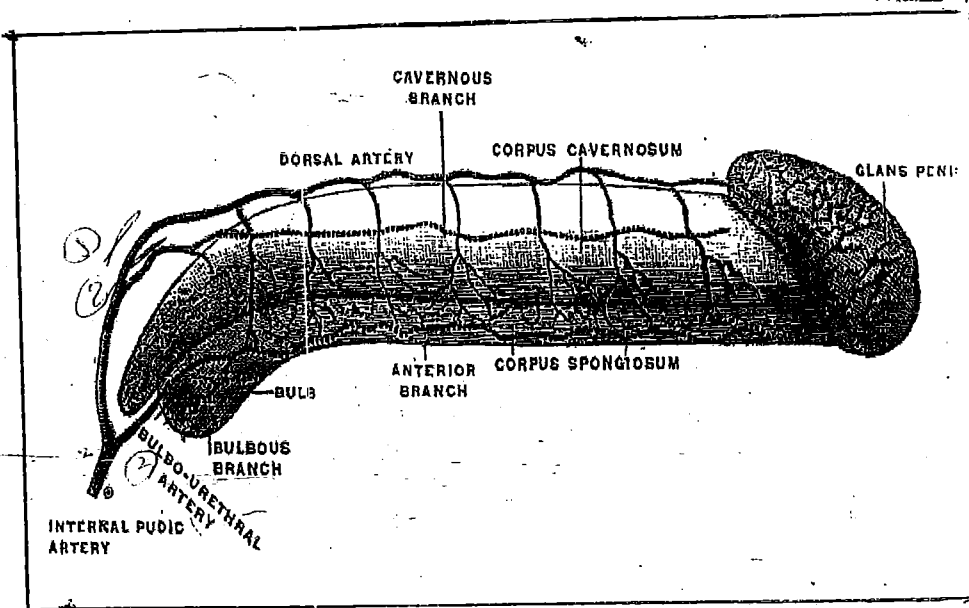


Figure 4 Muscles of the pelvic floor surround and support the erectile bodies and corpus spongiosum. In terms of sexual function, the most important muscles are the bulbospongiosus and the ischiocavernosus. These support the erect penis and also contract rhythmically at the time of orgasm to facilitate ejaculation



NB Shunt a.a. - Arteries that connect the Cavernosal & spongiosal a.a.

Penile skin → supplied by Ext. Pudendal artery (br. from Femoral a.).

Clinically important point

Arterial supply & penile Erection (Helicine & Shunt a.a.):  
The tortuous course & special arrangement of helicine a.a. are essential factors in ↑↑ Blood flow to cavernous spaces during erection... This is helped by 1 rich anastomosis bet. a.a of penis sp. 1 Shunt a.a. (that connect 1 deep penile a.a. in 1 Corpora Cavernosa & 1 a.a. in 1 Corpus Spongiosum..)

- Superficial draining Veins
- Deep draining
- Subtunical

Venous drainage

3 Systems

Superficial system  
→ (Above Buckle's)

Superf. dorsal vein (Paired)

drain SKIN facia.

• drainage: Saphenous → Femoral V.

Intermediate System  
→ (bet. Buckle's & Tunica)  
(deep dorsal) Single Vein & Circumflex

on dorsal penis.

drain glands C. spong. distal C. cav.

Terminate at Santorini (Periprostatic) plexus

Int. pudendal V

Int. iliac.

Deep system  
(subtunical).  
Cruial & cavernosal veins

drain Most C. Cav Some C. Sp

end at Int. iliac veins

Subtunical Veins  
Form Network that drain Cav. Tissue. They unite to form emissary veins that penetrate Tunica → intermediate system

NB : Subtunical (Emissary) Veins

Network of Venules under Tunica connect venous system bet. C. Cav. & C. Spong.

So MUSE is important

→ importance! contractile → erection of a.p.s

with Cav ↓  
Emissary Veins at Prox mol & Join to Femoral  
Cavernosal Vein that pass bet Cav & bulb → Int. pud.

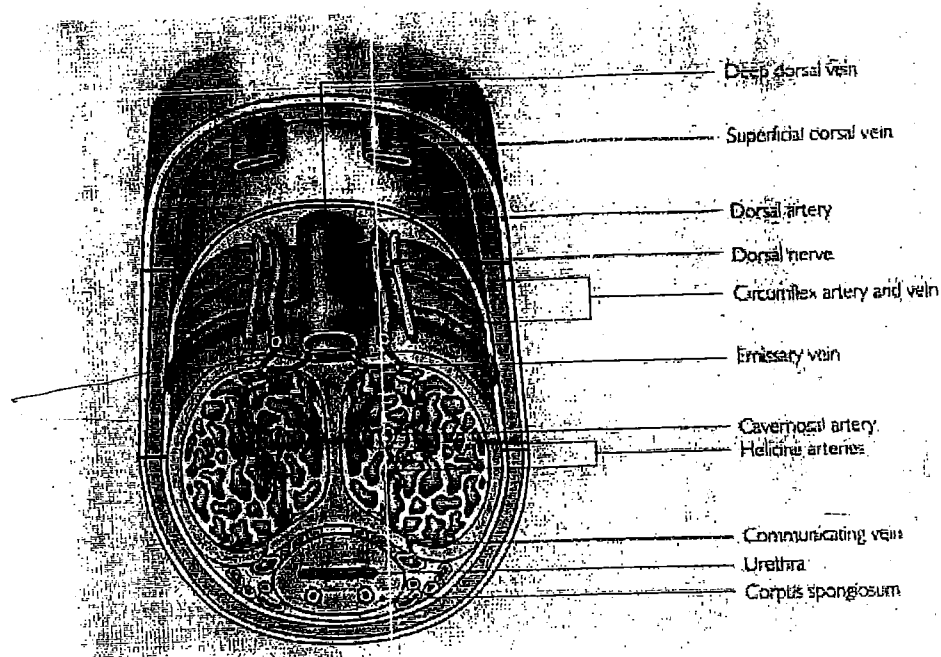


Figure 9 Cross-section of the penis showing the locations of the paired dorsal arteries and cavernosal arteries. Note the helicine arteries, which supply arterial blood to the lacunar spaces

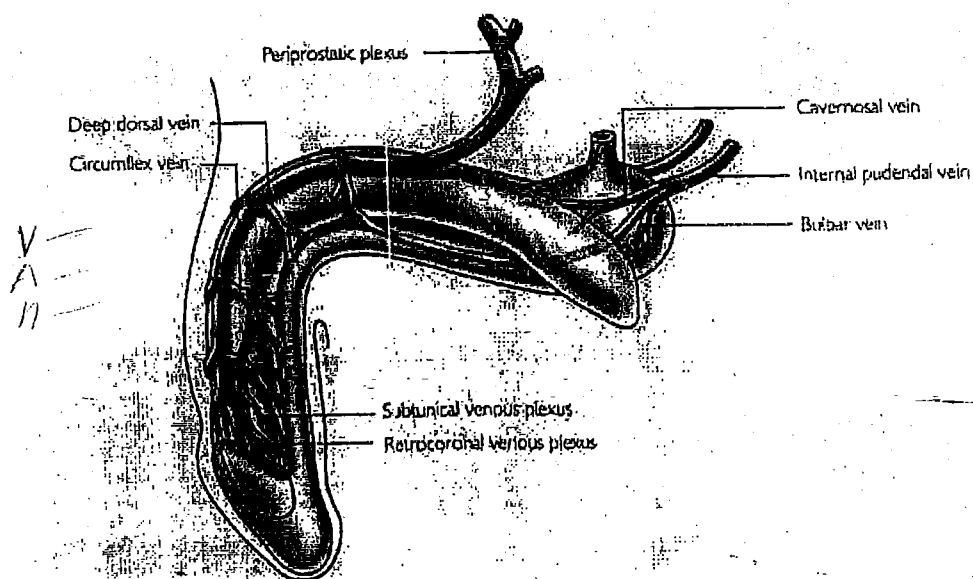
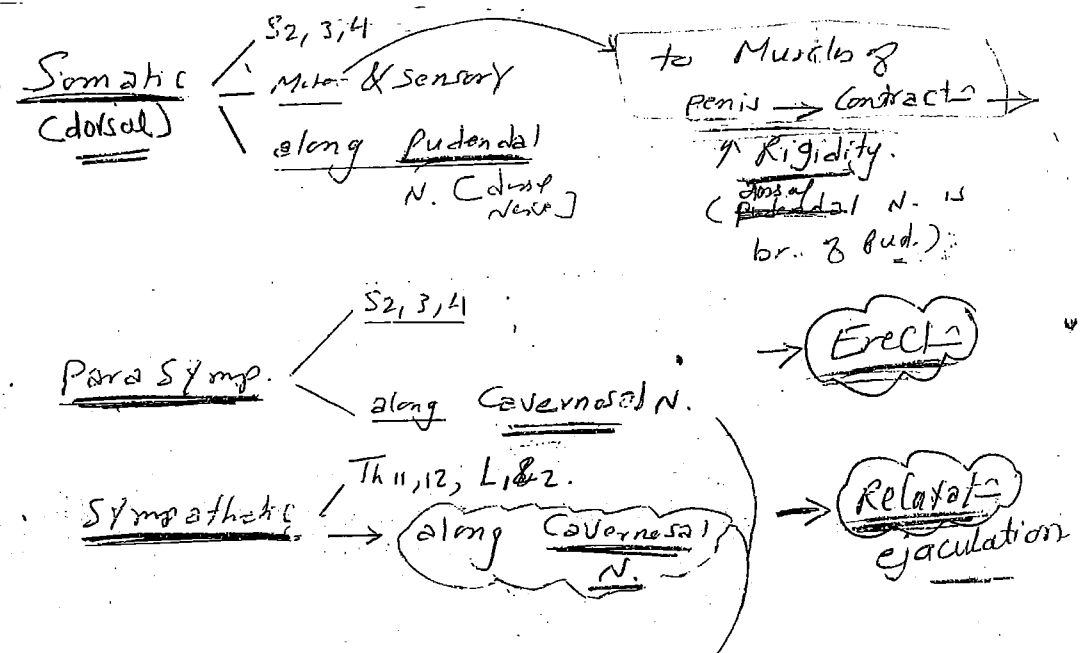


Figure 11 Venous drainage from the corpora cavernosa takes place mainly through the deep dorsal vein, which lies dorsally in the groove between the corpora and passes beneath the pubic arch to join the dorsal venous complex at the urethroprostatic junction. The less surgically accessible bulbar and cavernosal veins join to form the internal pudendal vein

Clinically important points:

- Compression of subtunical veins bet Enlarged sinusoids & the Tough T. Albuginea
- Important veno-occlusive Mechanisms for process of Erect-

Nerve Supply



Th<sub>11,12</sub>  
L<sub>1,2</sub>

• Lymphatic drainage:  
to Superficial & deep inguinal  
L.N → Int. & ext.  
iliac L.N

related to prostate &  
Vn-thra at 3 & 9 o'clock

↓

↳ Liability to injury during prostate surgery

↓

↳ ED



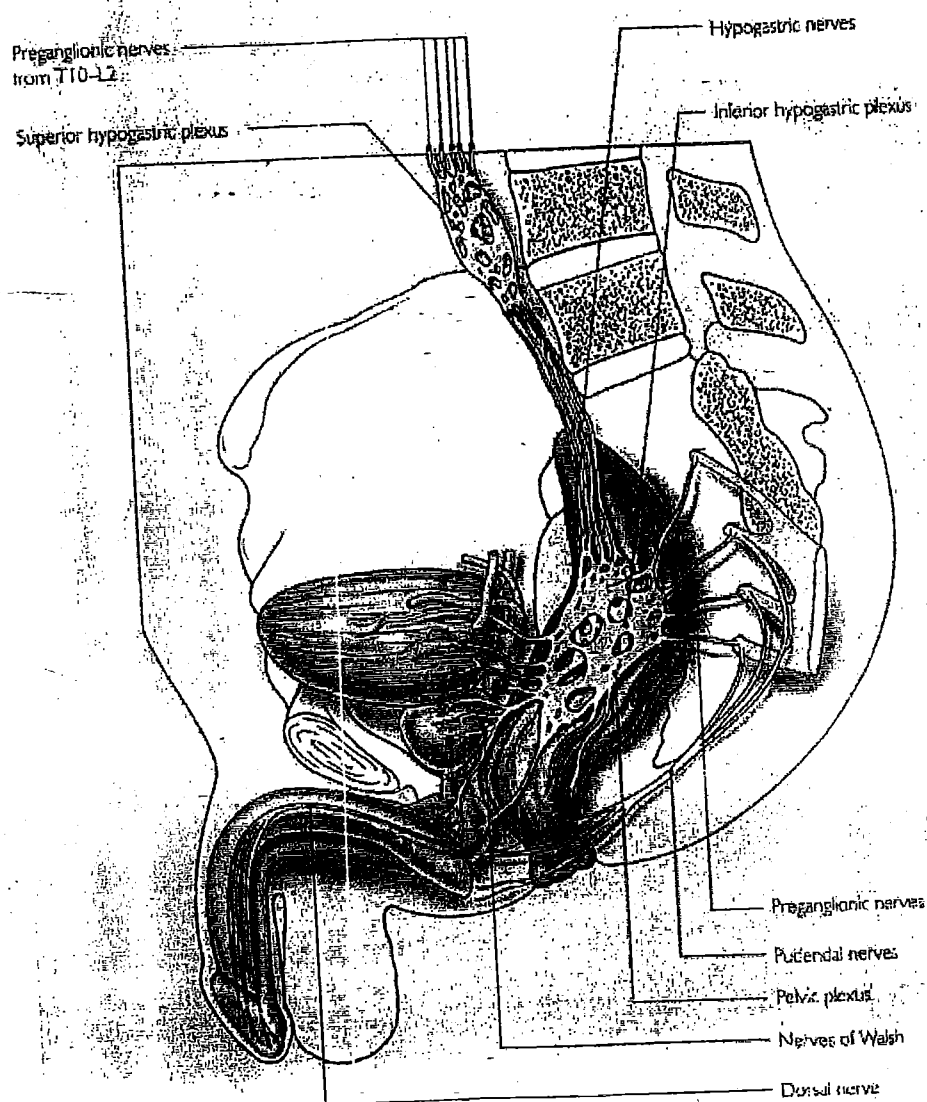


Figure 15 The hypogastric nerves are vulnerable during retroperitoneal lymph node dissection. Both sympathetic and parasympathetic nerves merge in the pelvic plexus and pass posterolateral to the prostate gland in the so-called neurovascular bundles of Walsh, where they may be damaged during radical prostatectomy and cystoprostatectomy



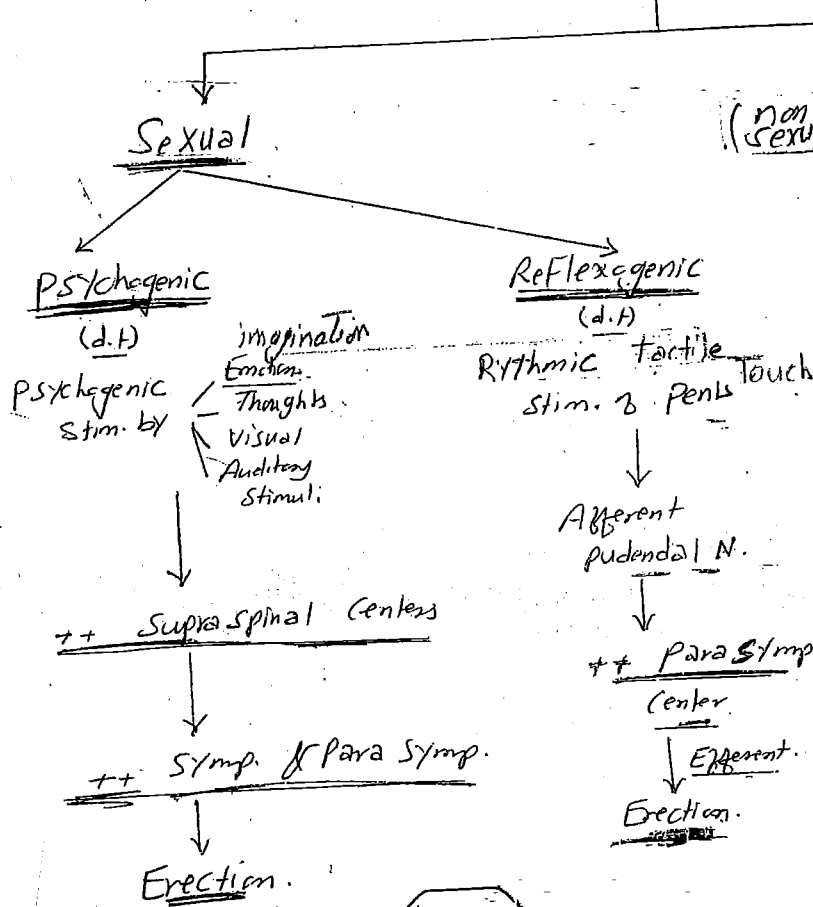
# Physiology of Erection

سؤال (سوال)

P. 18

- ① Types
- ② Components
- ③ Control (Mechanism)

## Types of Erection



during Sexual Intercourse Both occur.

• d.t unknown mech. but may be d.t ↓ decrease Supraspinal inhibition of Spinal Functions

3 Misreadings Related To Term:

① نعاس من بعد جناس اشارة لغيره  
نمكة ارقان بغير نعاس  
درد كبري في

② NPT = Nocturnal Penile Tumescence → So Tumescence Not "Rigidity"

③ Relation to awaking up & Full bladder

(Morning Erection)

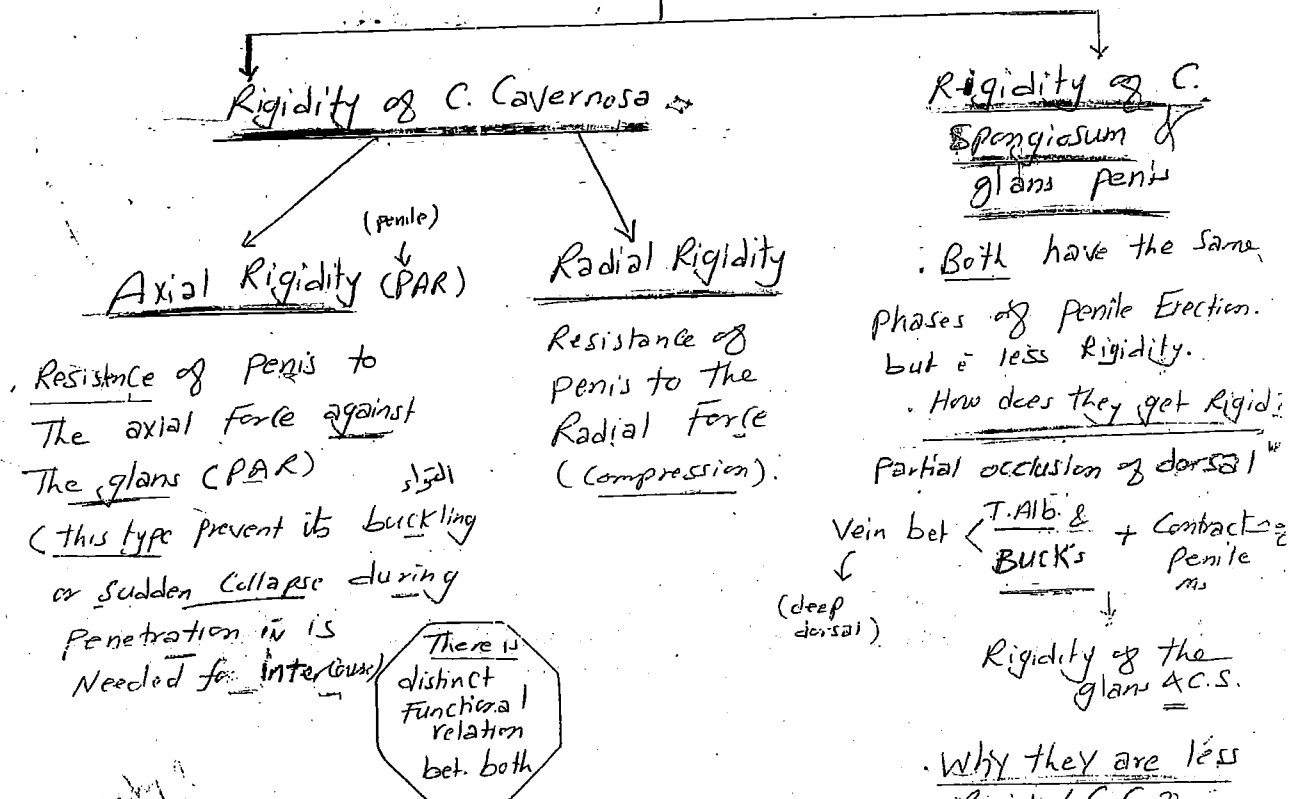
mistake to consider the morning erection related to full bladder (No relation)

Tumescence  
& Rigidity

## 2 Components of Erection (انقباض = انقباض) 19

① Tumescence (Swelling): ↑ length & Circumference (girth) of penis d.t ↑ Blood Vol.

## ② Rigidity:



Why? This rigidity is d.t Thick fibrous T.

Albuginea w. is 2 Layers Inner Circ. outer longit. →

↑ resistance & rigidity against the Expanding cavernous tissue that ass. compression of Subintimal Veins.

(Note) The 2 Layers of T. Albuginea become only 1 Layer at the ventromedial (3/4) Aspect of Cavern. → weak area w may be injured during Penile prosthesis. (to avoid Injury of this area & underlying urethra.)

Why they are less Rigid < C.C.?

- ① No Tunica in glans
- ② Thin Tunica at C. Spongiosum.
- ③ direct Contact bet glans & dorsal vein → Act as a shunt (AVF) during Erection → ↓ Rigidity.

Prosthetic C.S. must not be C.C.

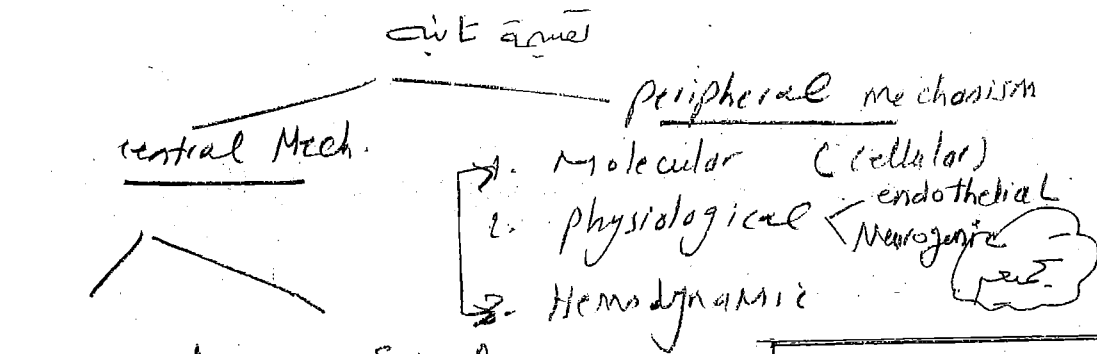
NB ① Low Rigidity of:

glans is d.t. & helps to ↓ cervical Trauma.  
 C. Spongiosum is d.t. & helps to preserve the urethra opened during ejac. For passage of semen.

② Functional Relation bet  $\left\langle \begin{matrix} \text{Axial} \\ \text{Radial} \end{matrix} \right.$  Rigidity is the basis for Nocturnal monitoring of penile Erection by Rigiscan. ✓

③ Mechanism of Erection

- Cellular Mechanism
- Endothelial ~
- Neurogenic ~
- Hemodynamic ~



Supraspinal

1. cerebral centers
2. Hypothalamic ~

sexual → emotion  
 → thought  
 → visual  
 → auditory

Spinal

- anatomy of penile nerves

<u>NB</u>	
<u>Neurotransmitters</u>	
<u>origin</u>	
A. <u>Erectogenic</u>	B. <u>Erectolytic</u>
• NO	Not a neurotransmitter → NA
• VIP	• NPY
• SP	• Endothelin-2
• ACholine	• PGN <sub>2</sub>
• CGRP	• PGF <sub>2α</sub>
• PGE <sub>1</sub>	• GABA
• Dopamine	
• oxytocin	

# 1. Cellular Mechanism

## Cellular

Erection is d.t: Relaxation of  
Smooth ms. of  
C. Cavernosum →  
↑ Blood Flow →  
Erection.

Flaccidity: d.t Contraction of  
These ms → ↓ Blood  
Flow → Flaccidity

### These Ms

Constitute: 50% of cavernous tissue mass.

Formed of 3 Elements:

- Actin → Thin
- Desmin → Intermediate
- Myosin → Thick

## Mechanism of

Relaxation (Erection)  
intracellular  
d.t → ↓ IC  $Ca^{+}$  d.t ↑ CAMP & CGMP  
→ Block  $Ca^{+}$  channels →  
relaxation → Erection.

## Inter Cellular (علاقه)

Inter Cellular Communicating  
channels of Gap Junction  
bet. The Smooth ms →  
Allow  $Ca^{+}$  Exchange bet. Cells  
→ Synchronized Contraction  
&  
Relaxation

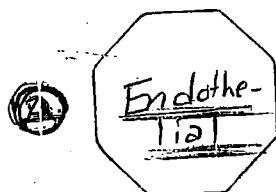
These channels Formed of  
(Connexin 43)

## Contraction (Flaccidity)

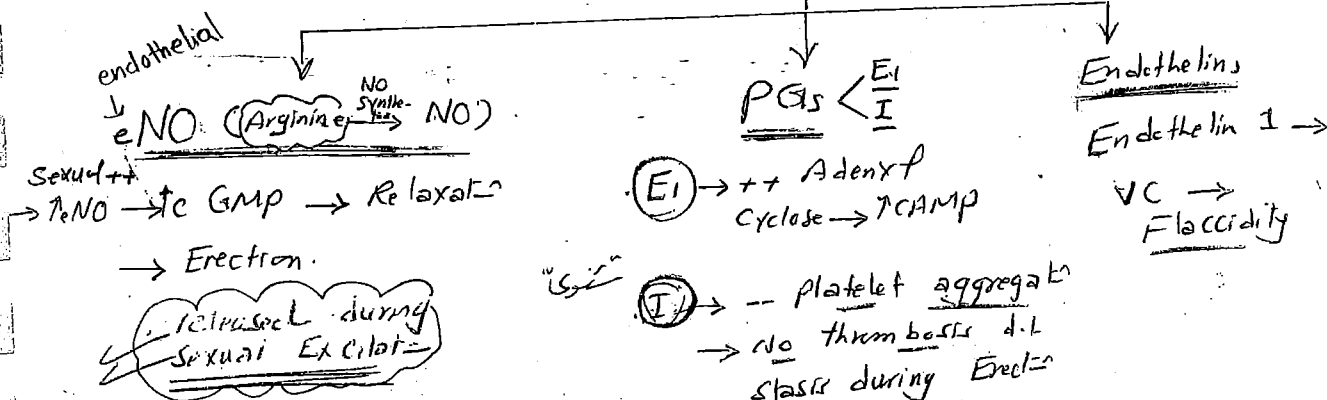
d.t ↑ IC  $Ca^{+}$  d.t ↑ ATP →  
Cross bridge bet. Actin  
& Myosin → Contraction  
→ detumescence.



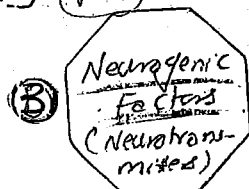
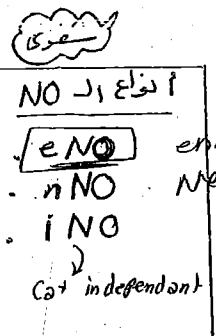
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Endothelium of C.V. aa C.C release ③



**NB**  $\left\{ \begin{array}{l} \text{NO \& PGs: need High } (pO_2) \text{ (Not in venous Blood or during Flaccidity).} \\ \text{Endothelins:} \end{array} \right.$



3 NeuroTransmitters released from nerve ending

**Cholinergic** (A. choline) (d.t. Parasymp. Stimulat-)

++ nNO release  
-- Adrenaline  
Relaxation & Erection.

**Adrenergic** (Noradrenaline d.t. Sympathetic ++)

++ α<sub>1</sub> (Constrict) → VC  
++ α<sub>2</sub> (arterial) → VC  
++ β (Both) → VD  
Flaccidity

**Non Cholinergic non Adrenergic**

↑ nNO, ↑ VIP → ↑ cGMP → Relaxation & Erection

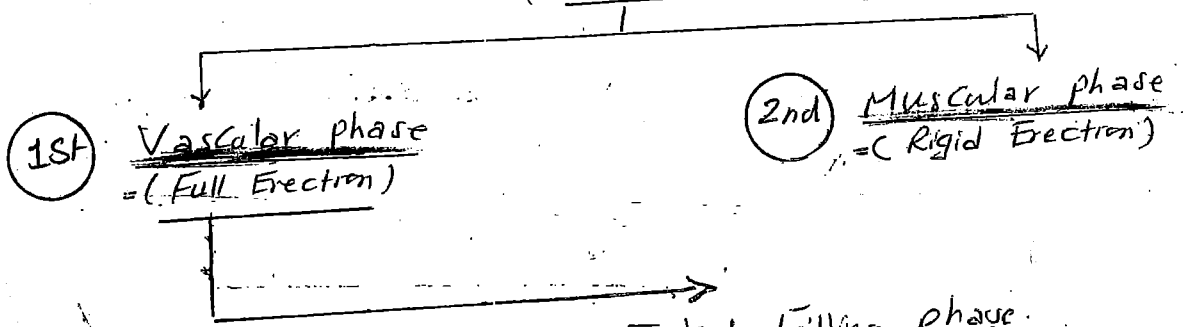
End. result VC (α:β 10:1)



So Nitric oxide may be Released from  
 Both  $\left\{ \begin{array}{l} \text{Endoth. (eNO)} \\ \text{Nerve (nNO)} \end{array} \right\}$  is the main Factor responsible for Erection.

سيف  
 لعل  
 لعل  
 لعل

### 4. Hemodynamic Aspects: Phases of Erection (2 phases)



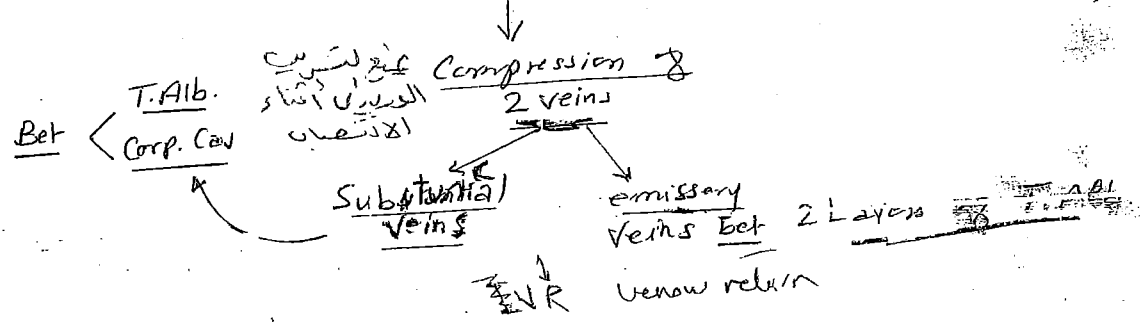
- (A) Initial Filling phase.
- (B) Tumescence "
- (C) Full Erection "

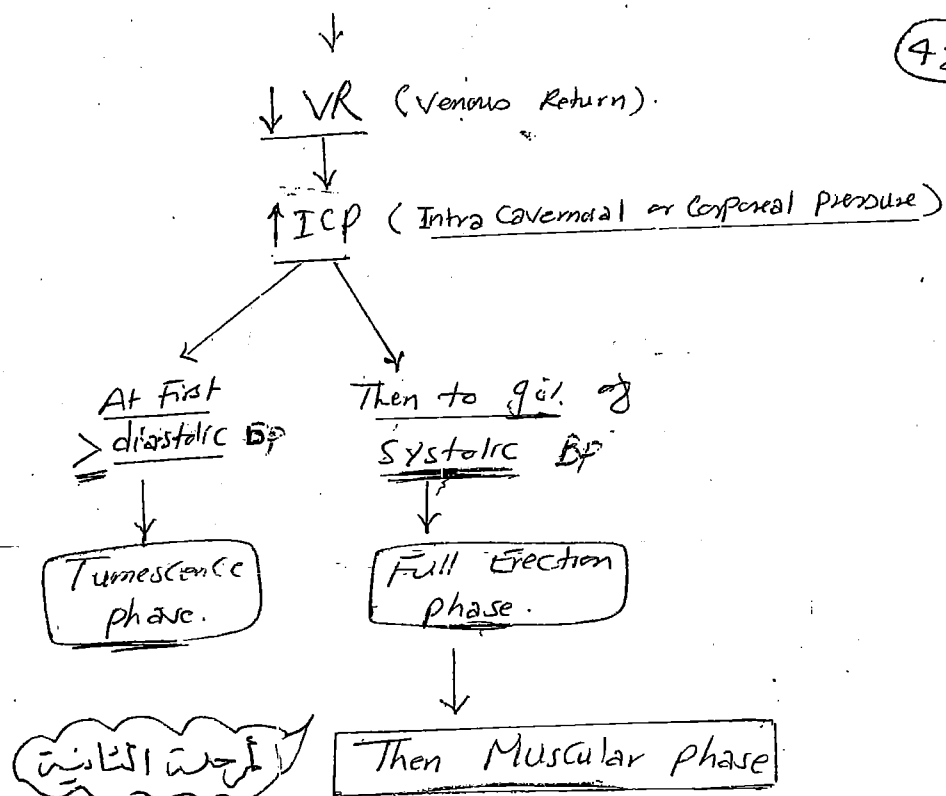
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#### (A) Initial Filling

- during resting conditions
- Symp. ++  $\rightarrow$  Contraction & C.C  $\rightarrow$  only small Blood enters for Nutrition.
- Cavernosa: 0.5 mm (diameter)
- Blood Flow Velocity:  $\leq 15$  cm/sec.
- during stimulated conditions (sex):
- Under  $\left\{ \begin{array}{l} \text{Endothelial factors} \\ \text{Neurotransmitters} \end{array} \right\}$
- Cavernosa:  $\approx 1$  mm
- Velocity:  $\approx 30$  cm/sec.

#### dilatation of Cavernosa & Tissue





Contraction of Ischio Cavernosus ms  
 → more venous compression →  
 ↑ ICP → No more blood enter  
 (Cav. Tissue becomes clotted) ( $ICP > \text{Systolic BP}$ )  
 its short stage d.t ms Fatigue  
 → NO ischemia or Tissue damage.

- ⇒ So phases of Erection can be summarized to
- 0: Flaccid phase (Minimum flow - minimum press.)
  - 1: Filling phase (Maximum flow - minimum press.)
  - 2: Tumescence " (↓ flow - Diastolic " )
  - 3: Full Erection " (↓↓ flow - Systolic press.)  $ICP = 90 \text{ SBP}$
  - 4: Rigid Erection " (Minimum flow - maximum press.)  $ICP > SBP$
  - 5: Initial detumescence: Slight ↑ ICP
  - 6: Slow " : slow ↓ ICP, slow reopening of veins & ↓ flow
  - 7: Fast " : Rapid ↓ ICP, Rapid " " " " & ↓ + low resting S.

# ED

(Impotence) ← (الضعف الجنسي)

def. → Persistent inability to   
 Initiate or to Maintain Penile Erection   
 Sufficient for Satisfactory Sexual Relations. (For  $\geq 3$  ms)

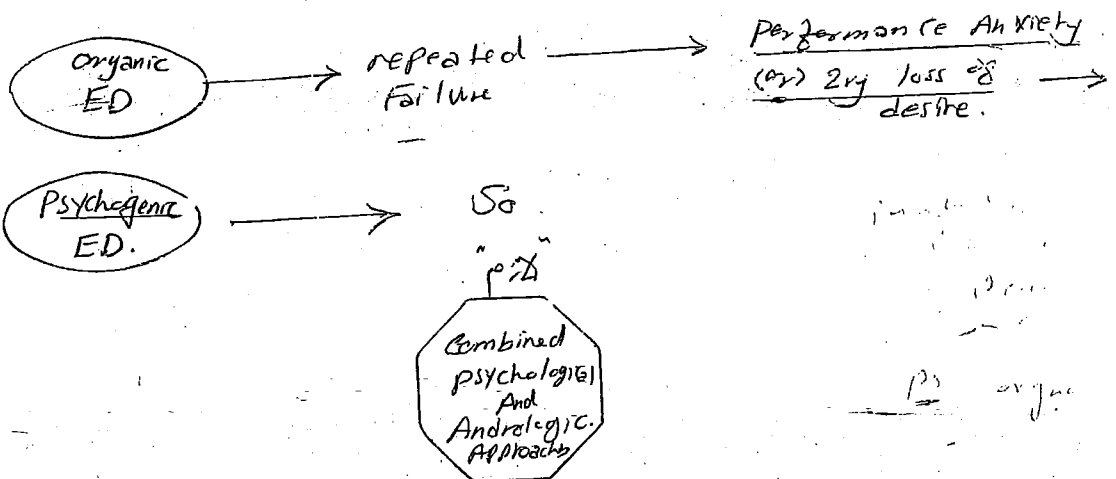
## Types of ED

Psychogenic (50%)

Organic (50%)

NB. Old % was  $\frac{90\%}{10\%}$  psychogenic / organic.

Most cases are Mixed & No sharp distinction   
 bet. the 2 Types because ED has   
 marked Impact on well being e.g



# • Psychogenic ED القاهرة جامعة القاهرة

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Master & Johnson classification  
(1970)

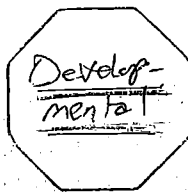
1. Developmental
2. Cognitive
3. Neurotic
4. Interpersonal

Lues Classification  
(1994)

- ① Type 1 : 3
- ② Type 2 : Depression
- ③ Type 3 : Marital disorders.
- ④ Type 4 : Mis information.
- ⑤ Type 5 : Psychotic disorders.

## Master & Johnsons

1



للعلاقة  
التي

parents

✓ ... Conflict ~~parent~~ child relationship.

• -ve parents attitude Towards Sex ✓

Infantile  
Masturbation

← (عقاب لما كانوا يفعلون) • Traumatic 1st. Coital Experience ✓

← (الجنس) • Homosexuality ✓

← (الجنس) • Gender Identity disorder  
(الجنس) ✓

2.

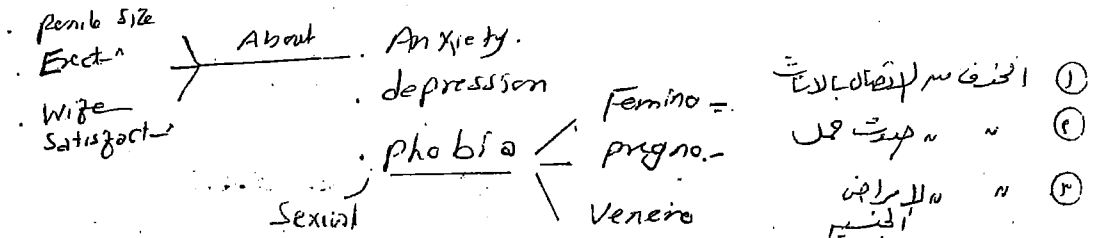


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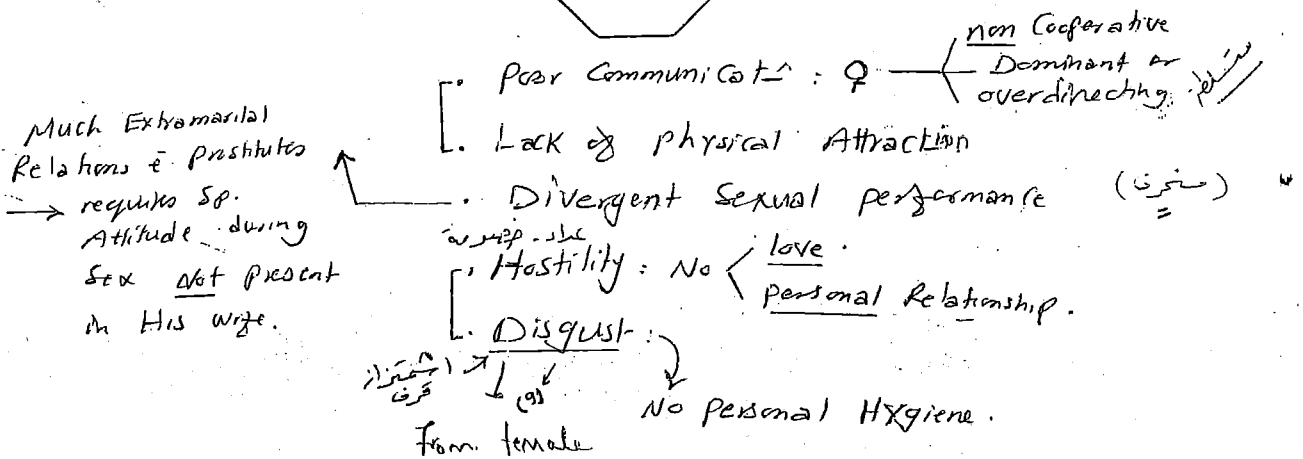
- Sexual Ignorance الجود
- Misconception مفهوم خاطئ
- Religious orthodoxy

120

### 3. Neurotic



### 4. Inter-Personal



### Lucas classification

#### Type I

- 3
- Performance Anxiety
  - Sexual phobias.
  - Widowers synd.

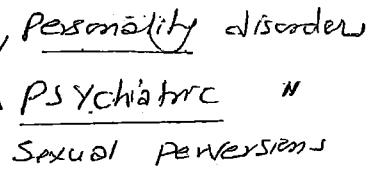
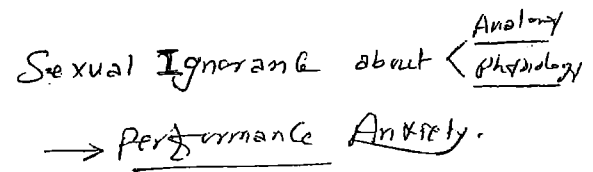
#### Type II

Depression due to Drugs or diseases.

#### Type III

marital disorders. (conflict & disturbances)

12-  
P  
Divergent  
Disgust  
From female



الأرض

✓ His wife becomes more dependant on him d.t. illness.

- ✓ He had sexual inhibitions & avoided to do Marital relations with his sick wife.

N.B

## AET. of Psychogenic.

wichow & synd

→ development  
→ output

- poushik

12/1-

1. 1000  
2. 1000  
3. 1000  
4. 1000  
5. 1000  
6. 1000  
7. 1000  
8. 1000  
9. 1000  
10. 1000

# Approach or Assessment of

## A Case of ED

[A] History

[B] Examination

[C] Differentiate bet organic & psychogenic.

[D] Determination of cause of organic.

عم كسري  
خلاص يوق قبل انما  
الكينطال

### 1. Personal Hx

Age  
Marital status  
children  
occupat-

special Habits

### 3. Hx of ED

onset, Course, durat-  
difficult initiate or Maintenance

Libido  
Morning Erect-

universal or selective

Ejaculat- e., PE or Anejac.  
orgasms  
Satisfact-

### A. History

#### 2. Sexual Hx

(i). Sexual development

(ii). Sexual Educat-

(iii). " Techniques (Fore & after play & Sexual posit-).

puberty. onset  
1st sexual experim  
masturbat-  
Homosexualit-

#### 4. Medical - Surgical - Drug Hx

DM  
HTN  
PVD  
LCF  
CRF

Pelvic fracture  
or  
operat-  
prostatet-  
omy.

Drug induced  
ED  
Cisapride  
Nifedipine  
SS

#### 5. Wife / Partner Hx

Cooperat-  
Attitude  
orient-

## B. Examination

### 1. General Signs of:

Hypogonadism  
systemic dis e., LCF or RF  
Pulse, BP, Neurological.

Atherosclerotic  
↓  
Atherosclerotic  
ED  
Sensation  
Trophic  
Changes

Breast  
Enlargement  
Swelling  
discharge

### 2. Genital exam

scrotum  
pylories - penoscrotal (?? hypogonadism)  
prostatic C PR) BPH  
prostatit-  
Nodules  
stenes.

Reflexes

See Anejaculat-

DM avoid androgens

1. Scrotal reflex  
2. cremasteric  
3. superficial Anal  
4. Deep "  
5. Bulbo cavernosus R.

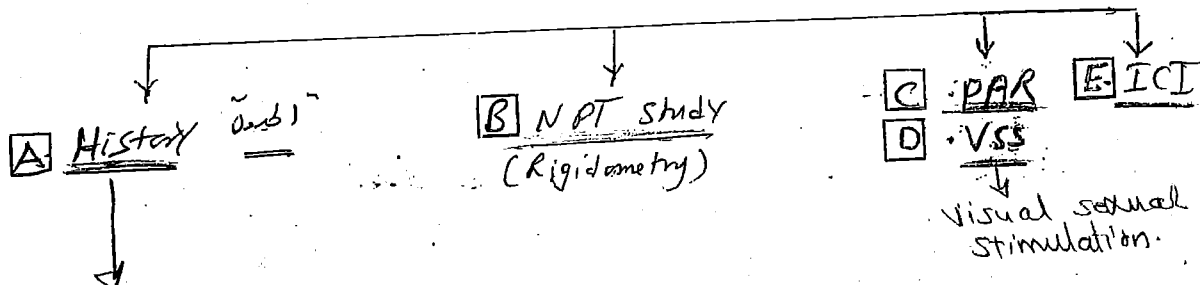
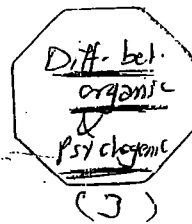


Table 7-1: Major differences between psychogenic and organic ED.

	Psychogenic ED	Organic ED
Onset:	Usually acute	Usually gradual
Course:	Variable	Steady
Circumstances:	Situational	Global
Noncoital erection:	Rigid	Poor
Psychosexual problems:	Long history	Secondary
Anxiety:	Primary	Secondary

NPT study (Rigidometry) = Rigiscan = Nocturnal penile tumescence

# principles:

- ① During sleep (نوم) nocturnal Erections occur & are ass. with REM phase of sleep.

Episodes:

- ② No. of Tumescence / Night: 4-5 episodes (or 3-6)
- ③ occurring / Every: 90 mins.
- ④ lasting for  $\geq 10$  mins. (or  $\geq 30$ )

(So Total Tumescence / Night = 90 minutes).

\* Adv. - eliminate of psychogenic element  $\rightarrow$  differentiate bet. 2 types of ED. CNL NPT = NL Neuro-Vascular

if  $\begin{cases} \text{NL} \rightarrow \text{Psychogenic} \\ \text{AbNL} \rightarrow \text{Organic} \end{cases}$



# Rigiscan 1988

Def: Ambulatory unit for measurement of:

both penile  $\left\langle \begin{array}{l} \text{Transience \&} \\ \text{Rigidity} \end{array} \right.$

Components: 2 Components:

## ① NPT data logging unit:

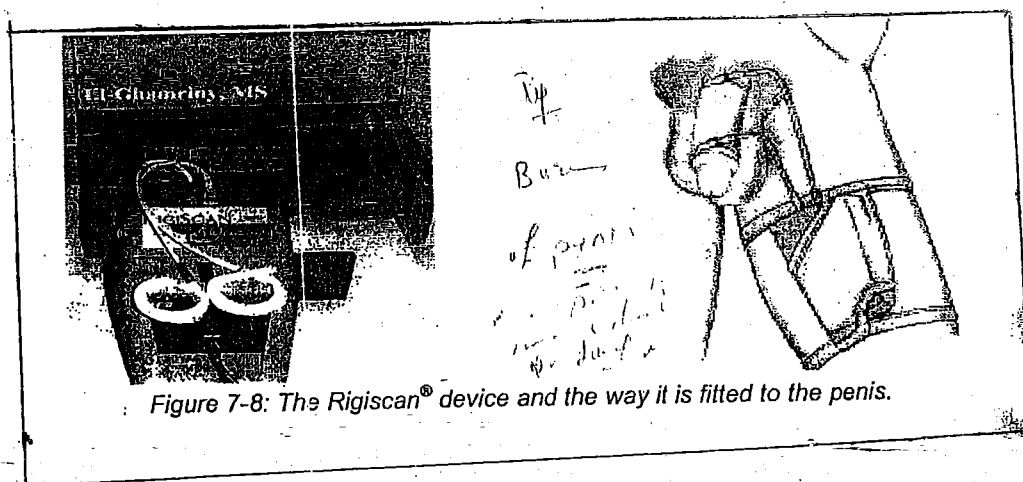
strapped to pt's thigh  
during sleep - 2 Loops.  
placed around i. base and i tip  
of penis.

نقطة (Loops) في الفخذ  
أثناء النوم - 2 حلقات  
توضع حول قاعدة  
و طرف القضيب

Tip  
Base

## ② Microcomputer & Printer: to record No &

duration of Erections / Night.



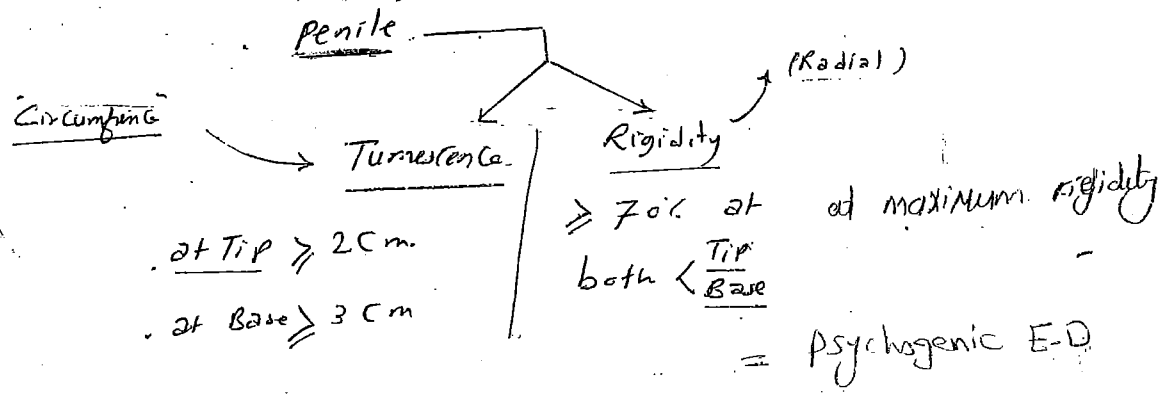
NPT data  
logging unit

Micro  
computer

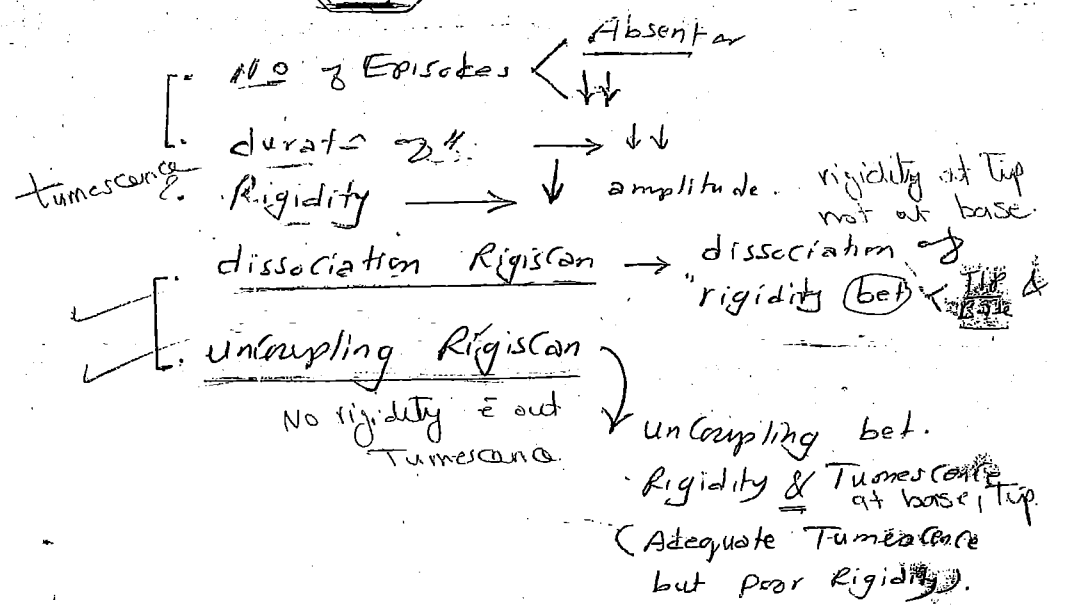
**NL**  
**Rigiscan**  
**Findings**

(Exipilino)

- No. of Erections / Night : 4-5 (or 3-5) <sup>2201</sup>
- duration of Each episode :  $\geq 10$  min (or  $\geq 30$ )



**AbNL**  
**Rigiscan**  
**Findings**  
**may b.**



at Tip & Base

2-3 Nights monitoring if 1st Night is NL  $\rightarrow$  No need For 2, 3 Nights.

ip 1st & 2nd E. Result:   
 - NL in Psychogenic ED Except (deep psychogenic, sleep disorders, trauma, Etc.)   
 - AbNL = organic ED Except (Neurogenic ED & pelvic stand  $\rightarrow$  penis not responding)   
 atherosclerosis of IIA  $\rightarrow$   $\downarrow$  b. supply to penis  $\rightarrow$  Shunt in during sexual actio

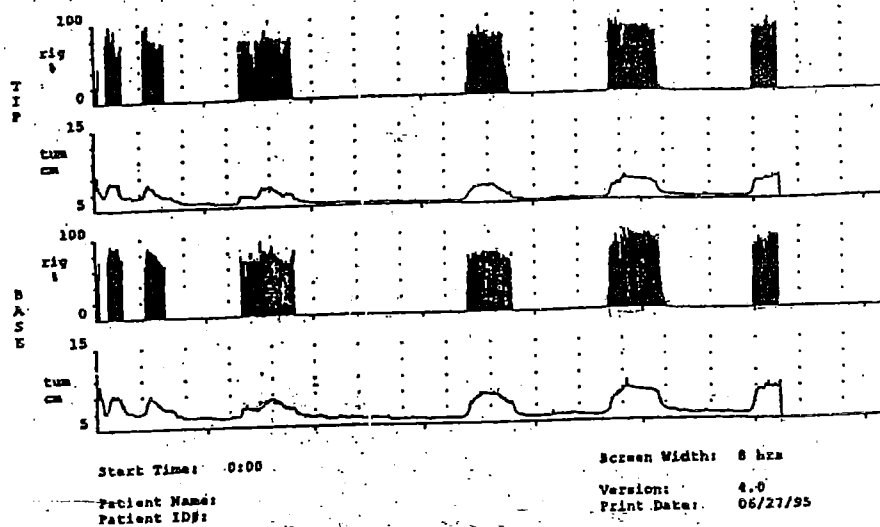


Figure 7-9: Graphic printout of NPTR in a normal 52-year-old male.

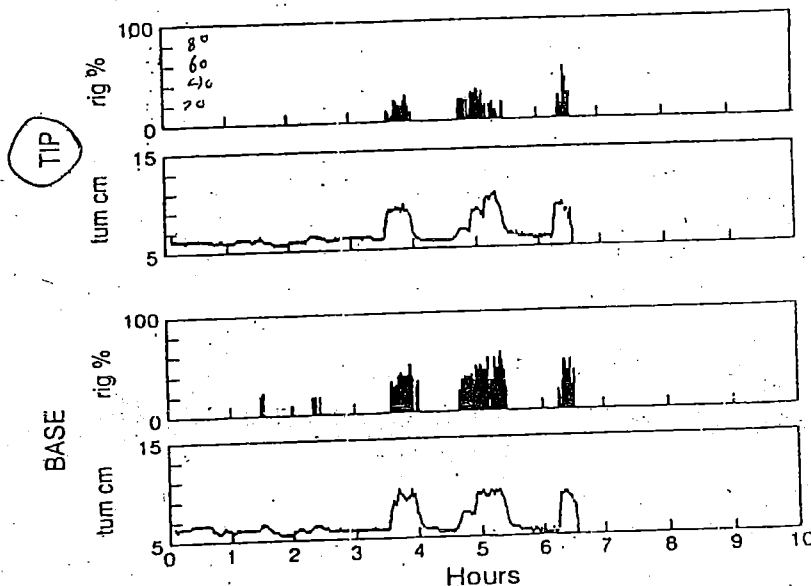


Figure 7-10: Uncoupling. Rigiscan® with adequate tumescence at base and tip, but poor base and tip rigidity.

### Measurement of Penile Axial Rigidity (PAR) (DIR)

Infect

by Digital Inflation Rigidometer.

Pressure Capacity of PAR Expressed in grams

> 500 grams Need For Penetration of Lubricated Vag.

> 500 gram normal

X Allow measurement of:

① Measure PAR

② ICP

③ penile Temp.

④ Total Time of Erect

مرد و زن

نهی

است

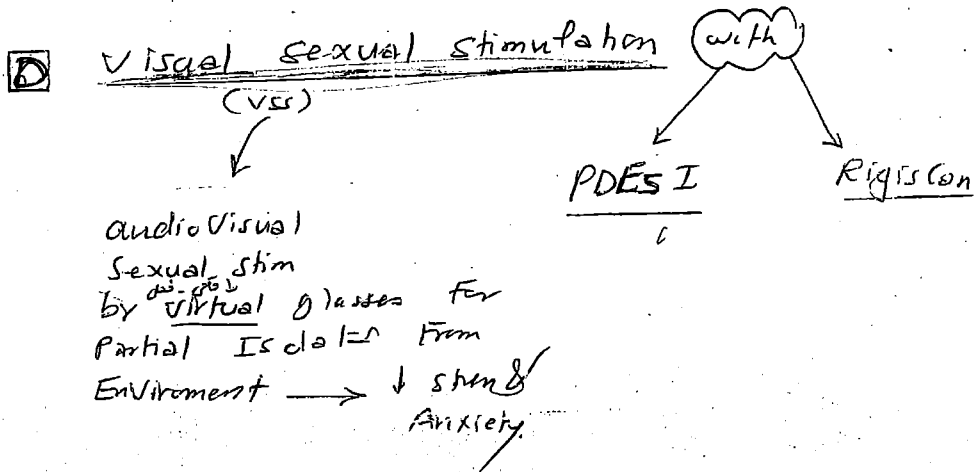
استاد الجامع مع لزوم تالیف این آثار  
درجه سه انتخاب ستیزه بک

سیستم بصری

ICI ~ Visual or Audio Sexual  
stimulation

① و بعضی اوقات (برود) (طبیعی)

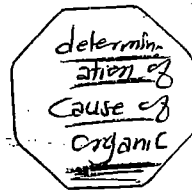
② ستیزه Cone بتاع بک : در نقطه بدرجه انه می توانی ب glans  
لکه ۱۵ ثانیه می "glans penis" در لحظه زین



need to be relaxed rapidly  
by light & infrasonic  
5.0 Hz sound pressure  
level  
[attenuated] [latent] [all the ICF  
on 4.5 Hz]

③  
VSS  
PDEs I

39



Total  
Free

Testosterone level (Serum Morning)

• prolactin (Serum Fasting)

• Blood Sugars → (By HbA1C)

• lipid Profile

• PSA

• LFTs

ND Hypogonadism was thought as rare cause of ED but now day There significant effect of hypogonadism as men age & there is

relates bet  $\left\{ \begin{array}{l} \text{Hypogonadism,} \\ \text{Depression,} \\ \text{ED.} \end{array} \right.$

PSA  
LFTs

# Q risk factors for erectile dysfunction

## Causes of ED

### Arterial impotence 200%

#### 1. Vascular causes

30%

2006

Q Arterogenic ED causes

10%

Q management of arterial ED

2006 Q Veno-occlusive ED  
corpora-veno-occlusive D.  
→ "M" xed

10%

10%

2006 Q Et of arterial ED

#### 2. Neurogenic ED

10%

Q evaluation of arterial ED

#### 3. Penile Causes 3%

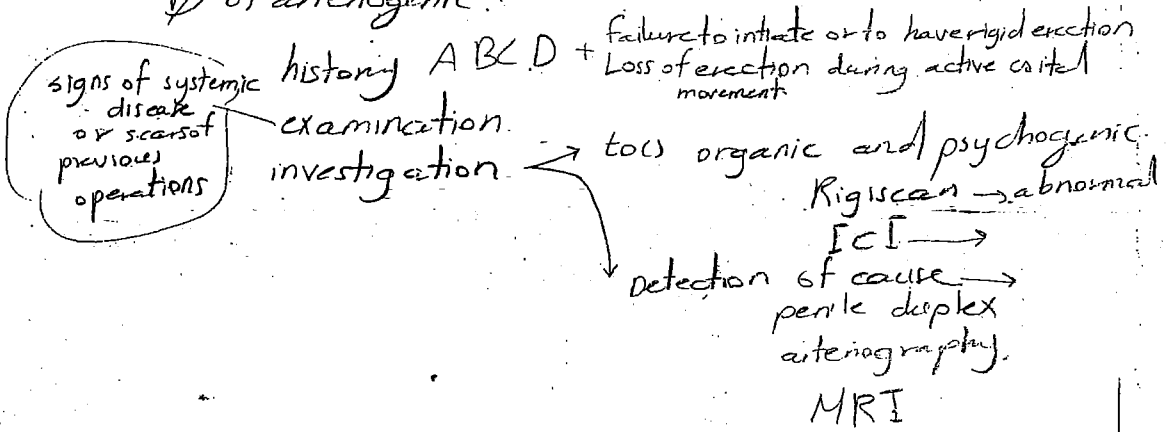
Pyromia  
Priapism  
penile fracture

#### 4. Endocrinal causes hyper-prolactinemia 5%

#### 5. Medical causes B.F

#### 6. Iatrogenic " (Drug Induced)

### Q of arteriogenic (evaluation of ED)



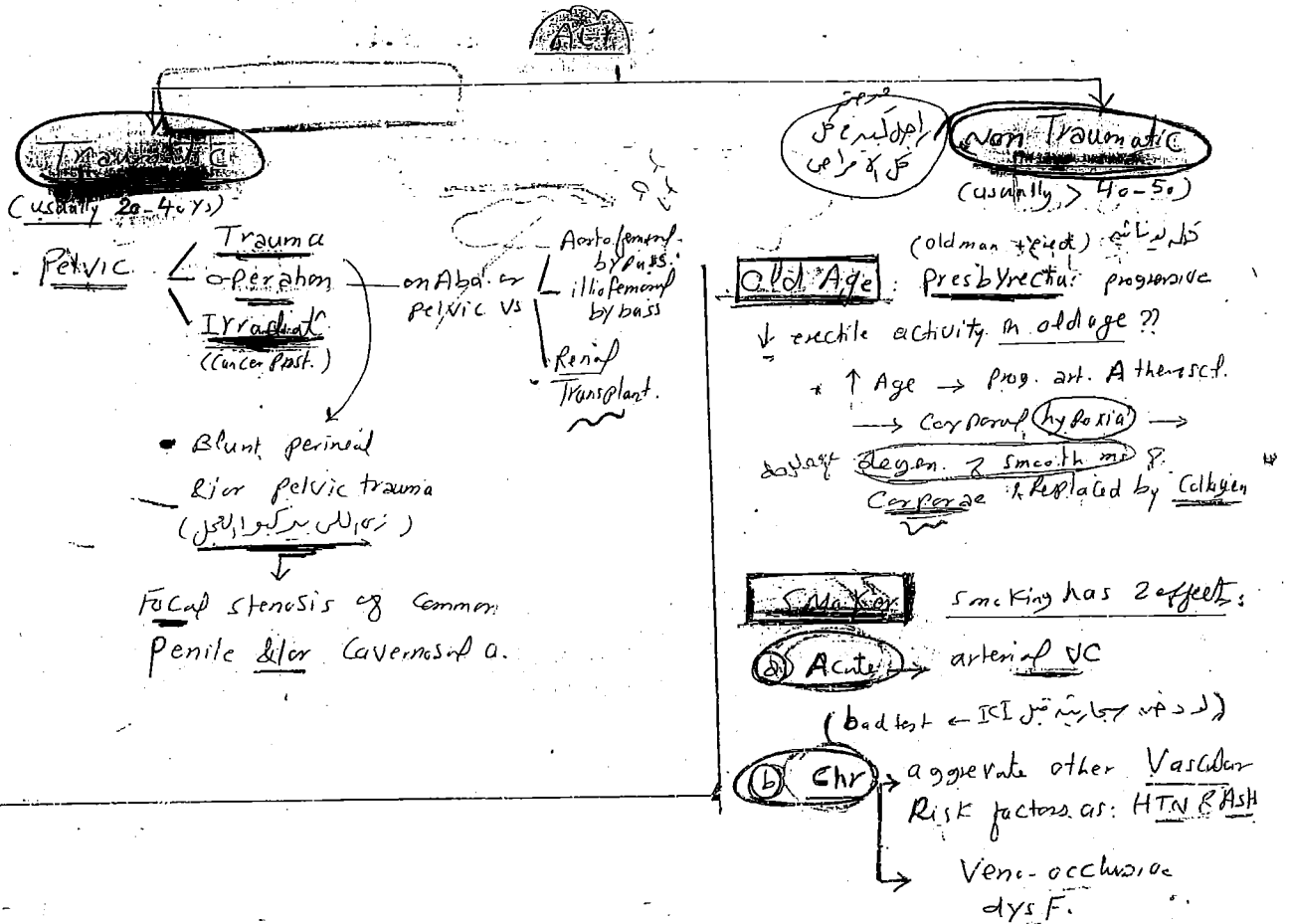
2. ② ED

1) ②

~~ED~~

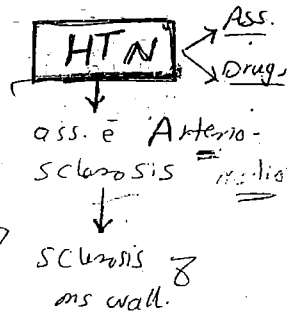


ED Resulting from any occlusive disease affecting C<sub>VO</sub>  
the penile aa. in presence of NL Corpora-Veno-occlusive  
Mechanism → defective filling → ↑ time needed to  
Initiate erection & for ↓ Rigidity.



Diabetic at 28:

- ① Small vs → angiopathy  
d.1 BM thickening  
↳ basement Membrane
- ② Large vs → accelerate  
Atherosclerosis



Atherosclerotic

↓  
cholesterol deposit  
in intima → narrowing  
of Lumen (when > 50%  
narrowing occur → ED)

Anti Hypertensives

AG to cut NB Synds e arterial ED

① Leriche Synd.: thrombotic oblit. of Aortic Bifurcation →

- ED
- ischemia & claudicate in Gluteal Regions.

② Iliac (pelvic) Stenosis: → Atherosclerosis of iliac aa. →

usually

the pt has good "erection at rest"

but once active coital (movements) start → loss of erection.

Falsehood e Rigiscan

- Explanation: Atherosclerosis of iliac aa. → is compensated by formation of collaterals w can induce & maintain erect at rest (but) active coital movem will deviate "steal" the blood into thigh ms → pelvic ischemia & ED.

ttt: Female superior position

clinical

DIAGNOSIS

① General ischemic. For pts e ED but stem done on the following points w suggest arterial AET:

1. Hx
2. Exam.
3. diff bet < org. / psych. >
4. Diagn. AET

History: Failed initiate & low rigidity

- loss of erection during coital movem
- Anti Hypertensives

\* Exam: HTN, Absent peripheral pulsations.

② ETIO:

differentiate bet < organic / psychogenic > by < ICI / Rigiscan >

Diagnosis of Artericogenic ED

- ✓ PPDU
- ✓ Arteriography
- ✓ MRI

• Radio Nucleotide Isotopes.



- ICI differentiate (1) psychogenic & organic (broof drug)
- pelvic steel Ex JPF
- Used ① PG E1 (10-20 ug) (accurate & overall erect rate 75% prolonged erect. 0.1%)
- ② papaverine (30-60 mg) + phentolamine (Rigilin<sup>®</sup> 1-2 mg) / Birnik or trimix
- ③ Rigilin alone or papaverine alone.

Look for → onset of erect ①  
 (30-45 min) Rrigidity ③  
 maintenance (durst) ②

ALL: NL erection occur in < 15 min w is Rigid & maintained for (15-30) mins good rigidity

Interpretate → QNLICI in this case (NL ICI)

AET + (false +ve) → Psychogenic ←  
 Neurogenic ←  
 Endocrinol ←  
 Pelvic steel synd (PSS) ←

② in arterial ED: slow erection & low lack of Rrigidity (slow > 30 min)

③ Venogenic → Failure to maintain - Normal initiation

④ Neurogenic → NL or exaggerated.

⑤ False -ve: anxious patient may give picture similar to arterial ED ✓

to differentiate:

do Combined Injection & stimulation tests (CIS) by VSS To release Anxiety  
 For 15 mins: pt (inf) do sexual stim. either by Manual or audiovisual

Complications: → Prolonged erection & priapism.

So to → ↓ anxiety: → CIS test.  
 defect PSS: → exercise.

what is

False -ve ICI ??

→ anxiety

False +ve ICI ??

→ NL

ICI

prolonged

NB

• Viagra

• CIS

• Pelvic steel test

ED

(A) Traumatic

49

P. 41

cholesterol deposit in wall (Intima)

① Hypertension (ED occurs in occlusion of > 50% diameter)

② DM → atherosclerosis → occlusion of lumen d.t. BM thickening. accelerated atherosclerosis.

③ HTN ∴ Arteriosclerosis → narrowing of lumen d.t. sclerosis by collagen Ant HTN

④ Aging (presbyopia)

d.t. atherosclerosis → thickening of CC  
replacement of smooth muscle by collagen

⑤ Smoking → Acute V  
effects → Chronic aggregation with HTN

also → thrombogenic ED

Am	Smoking
DM	HTN
	Hyper

## (Traumatic)

- ①. Traumatic : source of trauma on Abdom. or Pelvic V's  
 Such as :  
 • Acute femoral by gun  
 • iliofemoral  
 • Pelvic irradiation

## (Non) Non Ischaemic

Blunt perineal → Blunt perineal  
 Pelvic Trauma →  
 Focal stenosis  
 Common perineal  
 (arteriovenous)

False NL ICI &  
 Right Can  
 NL Erect at rest &  
 lost at active movement

## \* Leriche Synd:

• Thrombotic obliteration of  
 Aortic Bifurcation → Ischaemia  
 → ED + Claudication pain (thigh & Buttocks)

Pelvic steal  
 Synd. Atherosclerosis  
 of iliac arteries. Collaterals  
 compensate for pelvic supply  
 during rest. but at Active  
 Coital movement → steal of  
 Blood from Collaterals to  
 gluteal m's → lost erection

### Diagnosis

- (1) Hx : Failed Initials &/or lack of rigidity + الرجل  
الصلب
- (2) Exam : see the Etiology
- (3) Inv.

(i) Diff. bet organic &  
 Psychogenic

- Rigid Can
- ICI

(ii) Diagnosis of Arteriogenic

- PPDU
- Arteriography
- MRI
- Radiolabel
- obsolete tests

# Penile Duplex (Pharmacogenic Duplex US) (PDU)

P. 43

We have to comment during the 2 phases:

- ① Flaccid phase
- ② Erect phase (after pharmacologically induced erect)

## during Flaccid Phase

NL finding

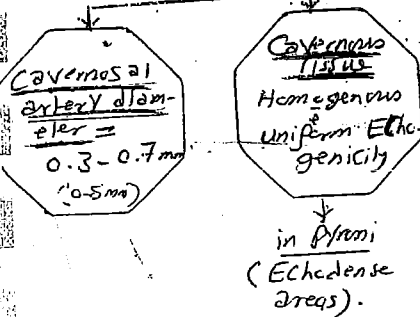


Image:

- ① Corpora Cavernosa
- ② Corpus Spongiosum
- ③ Tunica Albuginea
- ④ Cavernosal artery diameter

## during erection phase (after ICI)

Look for the 1st 5 mins. after After injection

ing 0.5-1

& comment on (ing 0.5-1)

PSV < 25  
EDV > 7 } AbNL

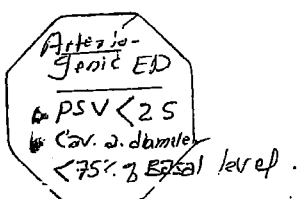
PSV: 25-35 } equivalent  
EDV: 5-7 } Repeat.

✓ PSV > 35  
✓ EDV < 5 } NL PDU

- ① Cavernosal artery diameter → should be 75% of its base (Flaccid level)
  - ② PSV → should be > 25-35 cm/sec. (75% level)
  - ③ EDV → should be < 5-7 cm/sec. (< 5)
  - ④ Resistance index → NL = 1
  - ⑤ Pulsations: must be present.
- an important indicator for health of the artery because PSV > 25 but is Absence pulsations

used For D 8:

- Arteriogenic ED (Sure D)
- Venogenic ED (not sure D).



$$\text{What is R.I?} = \frac{\text{PSV} - \text{EDV}}{\text{PSV}} = 1$$

(because NL EDV is zero so)

R.I: • NLLY = 1  
• in venogenic ED (↑ EDV) → < 1

(ND) ONLY during: Full erection. the intracavernous pressure should  $\geq$  diastolic pressure so that blood enters the penis only during the systole & blood flow velocity during diastole should be (Near) Zero.

in Abnlly Corpora Venous leakage: Intra cav. pressure may be  $<$  diastolic  $\rightarrow$   $\uparrow$  diastolic Flow velocity  $> 7$  cm/sec.  $\rightarrow$  Venogenic Impotenc.

### Adv. of PDDU:

- ① minimally Invasive
- ② 1st line test for  $\phi$  of arteriogenic ED
- ③ Can Indirectly diagnose Corpora Venous ED  $\rightarrow$  Venogenic.
- ④ In contrast to arteriography; it:

invasive &  
gives only  
anatomic  
inform.

non invasive &  
gives functional  
inform.

non invasive  
not anatomic

### disadv.

- ① False -ve: d.t. sten. (do CIG).  
[Variant in cavernosal artery anatomy  $\rightarrow$  False Results.]

- ② test should be done during 1st 5 min, (w) will allow easy assessment of artery (but) after 5 min erect  $\uparrow$  & w. Cant allow assessment of Corpora-Venous occlusion (Jr. Excl.)

- ③ Variant in technique d.t. experience & Operator  
Position of probe: should be at Proximal of arterial branching

## Arteriography (2) <sup>artery</sup>

Indic: preoperatively to detect localized arterial stenosis  
(post traumatic) before penile Revascularizat  
So; indicated only in Small No of Cases.

(X) Method: • G.A or I-V diazepam.  
• ICI of Vaso-active drugs then selective  
Cannulat<sup>n</sup> of Int. iliac or int. pudendal then inject  
diluted contrast sol. to visualize anatomy  
& Radiography of Cavernosus aa.

Still under trial { MRI (3) some studies showed: significant difference in (MRI)  
Picture of Flaccid penis bet NL & ED Males

(X) Radiolabelled Isotopes (4) For evaluating penile Blood Flow

- Duplex → Function
- Arteriography → Anatomy
- Radionuclide → hemodynamics

<sup>131</sup>I labelled Human Serum Albumin (15)  
Given IV & the flow through penis is  
detected then if the level of <sup>131</sup>I-HSA  
doesn't ↑↑ after ICI ⇒ Vasculogenic ED diagnosed.  
ND NC

(X) Obsolete tests (used during Flaccidity)

### ① Penile Brachial pressure Index (PBI)

Ratio of: Brachial pns. & penile systolic pr. (if)  $< 0.6$  → arterial insuff<sup>ty</sup>  
Can be done: after & before exercise & diff.  $> 0.15$  → Rel. vas  
stat ss

### ② Doppler wave Form analysis:

• assess flow in penile aa. not the Cavernosus aa.  
• detect Flow in dors<sup>al</sup> a. (minim<sup>al</sup> Reb in end)

### ③ Penile thermography: → by urethral catheter

(ED)

Causal #

- Viagra
- ICI
- Prosthesis
- Revascularization

# 1 Causal #

- stop smoking
- Hyperlipidemia
- Revascularization #
- Control DM
- stop anti HTN #

## 2 Viagra

## 3 ICI

## 4 VCD

Vacuum constriction device

## 5 Penile Implant

(alternative to Revascularization)

NB:

Revascularization:

1. Indications (in very few pts can be achieved)

(E All success Rate = 70%)

- Age < 60
- No DM
- No diffuse art. pathology
- No delayed ICI Response
- No Venous dysf.
- PSV > 30 cm/sec.

↓ operations

A. Michel I: Inf. epig. artery anastomosed directly to Corpus Cavernosum (High failure Rate)

B. Michel II: Inf. epig. artery anastomosed to dorsal penile artery (so blood pass retrograde from dorsal penile to pudendal a)

C. Inf. epig. anastomosed directly to Cavernosal a.

D. Virag op.: Inf. epig. anastomosed directly to the deep dorsal vein.

(circle) inf-epig. anastomosed to

- Corpus Cavernosum (Michel I)
- Cavernosal a. (Michel II)
- dorsal penile a. (Michel II)
- deep dorsal vein. (Virag)

## Venogenic ED

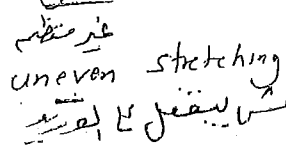
(Veno-occlusive or Corporo-Venous ED)

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Def → inability to trap the blood in the Corpora Cavernosa to maintain the Erection.  
 • So There is NL Initiation but Failed maintenance for few seconds; maximum 2 mins.

• No loss of Erection: during movement as in pelvic step stand.

Causes: divided into 5 types (Lue, 1988)

- ① type I: Cong. Ectopic Veins
  - d.t large ectopic veins existing directly from Corpora
  - usually found in young men & 1<sup>ry</sup> ED.
- ② type II: Abnormalities of Tunica Albuginea
  - DM
  - Aging
  - Pyronic's
  - Penile Trauma (during Erecto)
  - uneven stretching in: 
- ③ type III: Abnormalities of Cavernous smooth ms → inadequate Relaxat<sup>n</sup>
  - d.t ischemia induced atrophy, Fibrosis & degen. of ms: (in)
  - DM
  - Aging
  - Priapism
  - Hypercholesterolemia → cholesterol deposition
  - → Altered Collagen of C. Cav.
- ④ type IV: Inadequate Release of Neurotransmitters → No
  - DM.
  - Neurogenic ED.
  - Psychogenic ED.
  - Heavy smokers.
- ⑤ type V: Abnl Acquired Venous Communicat<sup>n</sup> (Fistula) (TTP)
  - bet Corp. Cav. & C. spong. & glans penis
  - Trauma
  - Transurethral Surgery
  - priapism after shunting operat<sup>n</sup>



NB1

Structural alterations to the fibroelastic components of the trabeculae may cause a loss of compliance and an inability to expand the trabeculae against the tunica albuginea to compress the sub-tunica venules. This may be a result of:

- Aging.
- Increased cross-linking of collagen fibers induced by non-enzymatic glycosylation and hypoxia.
- Altered synthesis of collagen associated with hypercholesterolemia.
- Surgery or trauma to the penis.

NB2: Combined Arterogenic & Corporovenogenic ED:

many pts have combined  $\uparrow$  &  $\uparrow$  ED d.t:

- DM
- Old age
- Smokers
- HTN
- Hyperlipidemia

Thus: Vasculogenic ED  
May account for ~  
80% of cases of ED

تاريخچه

## Diagnosis

### 1. History:

نوع اختلال نعوظی و اینکه تکراری است:

Failed maintenance (lost in <2-5 min)

Possible causes: DM, Smoking, operation = Hypercholesterolemia

### 2. Exam:

نوع اختلال نعوظی و اینکه تکراری است:

Peyroni's

Scarring of pelvic op.

general  
Local

### 3. Invs:

(A) to differentiate bet. organic & psychogenic:

- ICI
- RigiScan

(B) Detection of Corporo venous causes: (D of Venogenic ED)

PPDC Non sp.

pharmacologic dosimetry

Dynamic

Cavernosography  $\pm$  Alms  
or combined  
+ cavernosometry

The SPECIFIC for D of Venogenic ED

S8

## ① PPDU:

على أساس قيم حالة الادرغ بالاسناد لادبرطام ديس ادرغ لادبرطام دبرطام  
انتخاب (ES) .. ولوش دبرطام دبرطام ← طبعطام دبرطام  
[دبرطام دبرطام دبرطام دبرطام دبرطام]

How to Reach to ES: By ICI + large doses combined Agents CIS

PPDU: can diagnose Veno. ED indirectly, & should be confirmed by Cavernosometry

If PPDU shows:  $EDV > 7 \text{ cm/sec}$   
(after ES Ejector)  $RI < 1$  } → Venogenic Impotence

## ② Cavernosography: small

Radiologic visualization of penile venous drainage by inj. of radiopaque contrast media in

Flaccid penis → of little value (Can't diagnose leakage occurring during Erection)

## ③ Dynamic Cavernosometry Saline

Rubber at base of penis  
Two 21 gauge needles inserted in both sides of corpora Cav., one connected to infusion pump & the other to pressure monitor

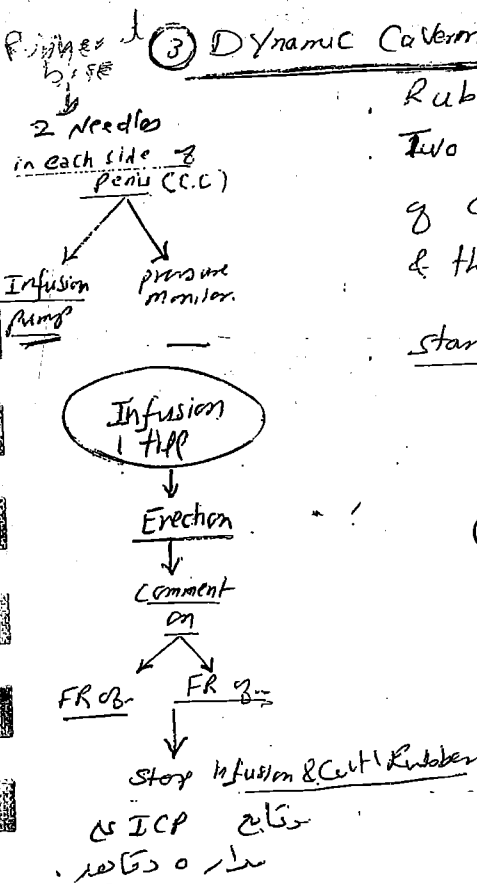
start the infusion of saline & comment on air erect

① Flow rate needed for induction of erection (usually:  $\approx 100 \text{ ml/min}$ )

② Flow rate needed to maintain erection (Maintenance flow rate)  $(20-50 \text{ ml/min})$

stop the pump & cut the rubber band & observe the ICP for 5 mins:

→ intracavernosal pressure



Venogenic ED diagnosed if:

. ICP  $< 90$  mmHg.

. Induct flow rate  $> 100$  ml/min

. Maintenance " "  $> 20-50$  ml/min.

④ Dynamic Cavernosometry - Cavernosography: (DICC):

the same technique but  $\bar{e}$  inj.  $\gamma$  Radio contrast medium & Veins are visualized.

⑤ Pharmacologic - Cavernosom. Cavernosography: ICI Test

it is the Method  $\gamma$  choice for diagnosis.

ICI  $\gamma$  vasoactive drugs used to  $\downarrow$  the amount  $\gamma$  saline perfusion needed to induce erection.

Technique

2, 21 butterfly gauge needles on both

sides of corpora, inject 0.5 ml Tribex

$\bar{e}$  Rubber at the base of penis for

2 mins then removed.

Infusion  
fipp

Erection  $\bar{e}$  ICP = 90 mmHg

Then comment on

(2)

FR. Needed For  
Induct. for  
Erection  $\bar{e}$  ICP  
(30-40 ml/min)

FR. Needed For  
Maintenance  $\bar{e}$  Erection  
or ICP  
( $< 5$  ml/min)

Then  $\uparrow$  ICP to 150 mmHg

Then stop Infusion

Then:

NB

Cavernosography

VLLY shows absent

Visualizat.  $\gamma$  penile Veins

in venogenic ED

. of  $\bar{e}$   $\bar{e}$   $\bar{e}$

. leakage.

FR = Flow  
rate

Ind. 5ml

.FR Ind. 30-40

.FR Maint.  $< 5$  ml

.ICP  $< 45$  mmHg

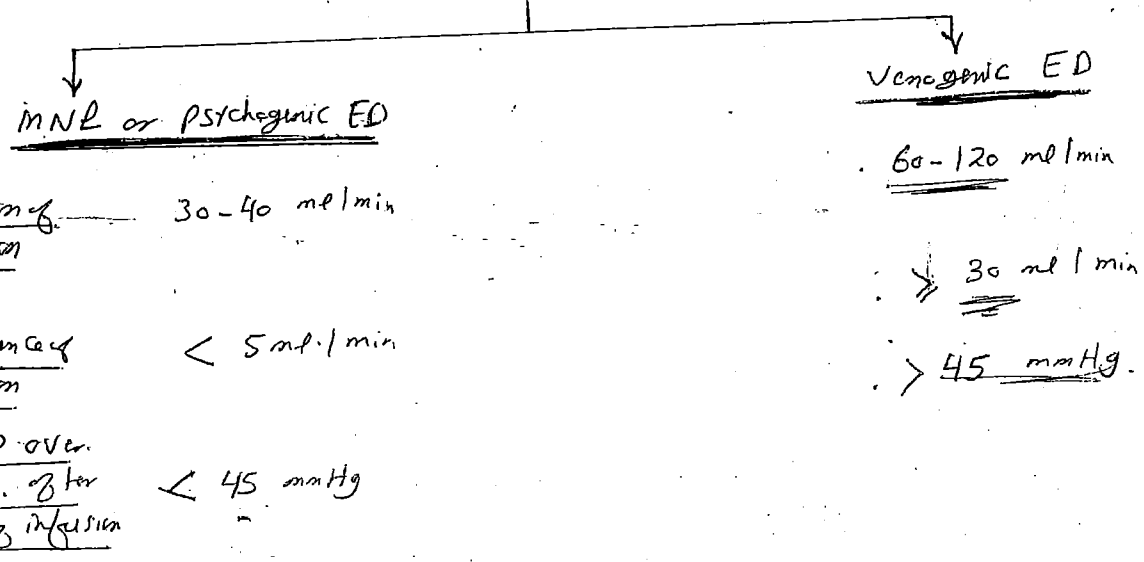
30 sec.

DETAILS: ... of ... over ...

After stoppage: [ICP: should be < 45 mm Hg in 30 secs.]

then inject Radio Contrast: Media to visualize the veins (Cavernosography)

### Summary of Values



NPBS: Induction Rate not important as it depends on Penile Size

### Causes of Venogenic Impotence

TYPE	TREATMENT
Congenital ectopic veins:	Venoligation operation "stripping & ligation of excessive veins". The deep dorsal vein and/or the cavernous veins can be ligated according to the condition. <u>disadv</u>
Abnormality of the tunica albuginea and cavernous smooth muscles:	Poor response to venous surgery. They are best treated by penile prosthesis.
Inadequate release of neurotransmitters:	According to the cause: • Pharmacotherapy in neurogenic type. (Viagra) • Psychological counseling or sex therapy in psychogenic type. • Arrest of smoking in heavy smokers.
Abnormal communication:	Surgical correction of the shunt or the fistula.

(disadv)  
• Success Rate 50%  
• High Recurrence Rate  
↓  
Not done now.

1. Causes of HF (See Above) →

2. Viagra
3. ICI
4. Prosthesis

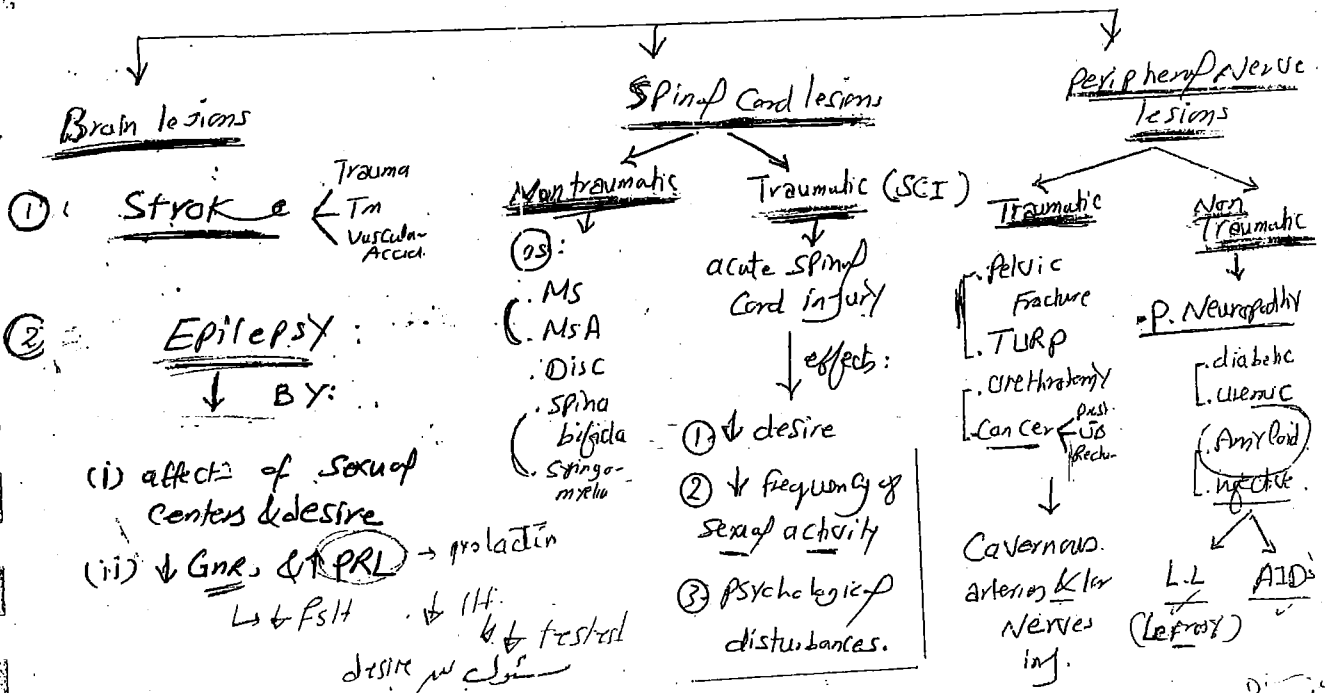
5. VCD

# Neurogenic ED (10-20%)

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(93)

AET:



③ MS → ED & Bladder dist.  
Multiple Sclerosis ↓ BY

(1) affect of sexual areas of Brain & Spinal Cord

(2) Psychogenic

④ MSA (Multiple System Atrophy)

① Parkinsonism

② Cerebellar ataxia

③ Autonomic failure (Shy Drager Synd)

↓  
Postural Hypotn.  
Bladder dysf.  
ED

## Spinal Cord Injury & Erection:

(SCI & ejaculat' ... ZP.K)

① Acute (or shock) stage: Complete loss of Reflexes & erection

② Recovery stage: Acc. to level & completeness of injury:

• Below T<sub>9</sub> → psychogenic may still occur

• Above S<sub>2</sub> → lost psychogenic only

• S<sub>2,3,4</sub> → loss of both psychogenic & Reflex. erect.

psychogenic mediated by symp. center (at T<sub>12</sub> & L<sub>1,2</sub>)

NB Psychogenic mediated by

Cerebral centers

T<sub>12</sub>, L<sub>1,2</sub>

Psychogenic Erect.

Diagnosis

- ① History
- ② Exam.
- ③ I.V.

LA

① Suggestive of Somatic Affect:

pudendal n. affection

DM  
Trauma  
3T. 1m  
Toxin  
MS

- DM
- Head or spinal trauma
- MS
- Toxins
- Brain Tms

② Suggestives of Autonomic Affect: th 10-11-12. S 134.

- DM
- Pelvic surgery
- bladder bowel dysf.
- Postural Hypotension.

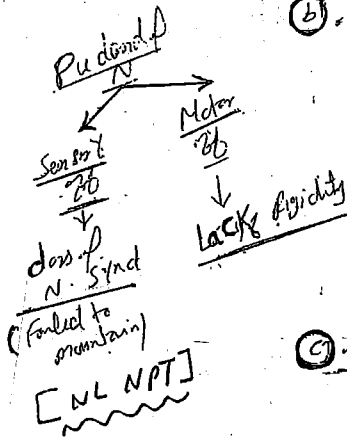
(any)

③ Sexual History

a. Failure to initiate → autonomic affection (Cavernous N.)  
somatic

b. Failure to Maintain → Dorsal Nerve Synd. → Post  
transmission of sensation from genitalia  
Summ. nerve  
occurs d.t. sensory affect of pudendal N.  
NL NPT (Rigiscan)  
Biothesiom.  
diagnosed by Dorsal Nerve Study

± ass e difficult ejac.



c. Loss of Rigidity → Affection of Motor part of Pudendal N. → Absent perineal ms contract.

False Normal Rigiscan → Neurogenic  
pelvic steal synd

## ② Examination:

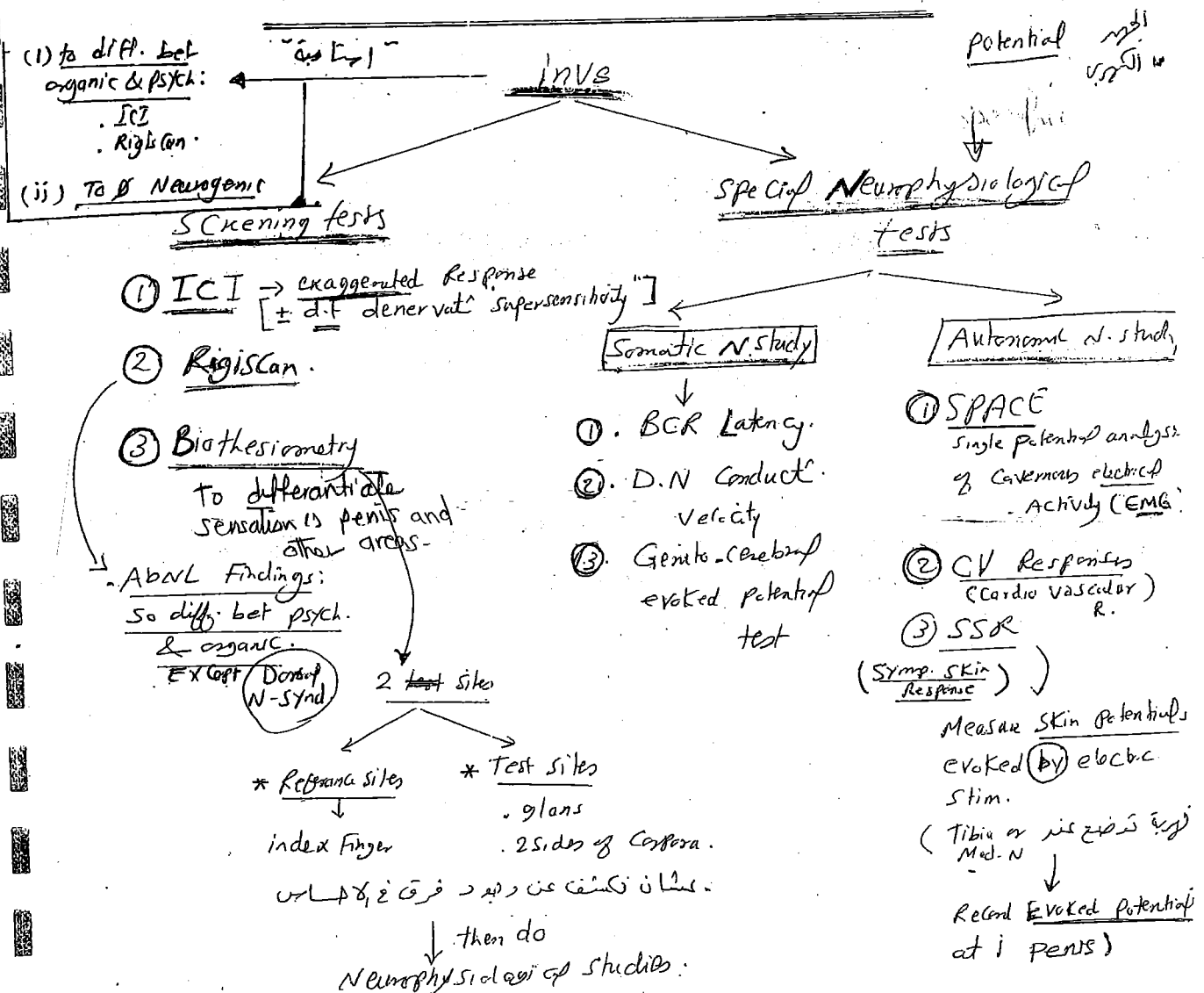
physical ex. → local - General - Neurological.  
 may reveal absent or reduced reflexes. Special Exam:  
 and sensation

② Penile Sensation: by Pin Prick testing  
 Temp. testing (by alcohol swab)

Glans p. is clitoris → [b] Bulbo-Cavernous Reflex (Sacral Reflex testing)  
 (BCR)  
 (detected in 70% of NL males)

Cont. of  
 Refr. m.  
 Cont. of  
 Ext. ansp.

(up to 100%) → \* if Absent in DAT → Signifying  
 ED dat P.N



# Neurophysiology of tests

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## Somatic N. Study

→ ① BOR latency Bulbo cavernosus reflex.

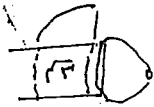
4 electrodes — 2 Stimul.  
2 recording

2 stimulating Ring electrodes

2 Recording Needle electrodes

Corpus cavernosus bulb. expl.  
→ 2 - one expl.

inserted at Rt & left  
ischio  
bulbo cavernosus muscles  
to record response.



only there's latent period bet. applicat<sup>n</sup> of stimulus  
& recording the response; if prolonged ⇒ neurogenic  
dysf.

② if the recording Electrodes  
put at:

✓ ✓ Central Cortex  
Spinal Cortex

✓ ✓ Glans & Penile  
Base

→ ② Genito-Cerebral  
Evoked Potential

→ ③ Dorsal N.  
Conduct-  
Velocity



## Autonomic N. Studies

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EMG ① SPACE: single potential analysis of cavernous electric activity using cavernous EMG to record cavernous electrical activity

② CV Response: Record changes in  $\frac{HR}{BP}$  during:  
→ Cardiovascular response: quiet & deep breath response: postural changes.

Not dependable

↓  
So evaluate the autonomic supply (Indirect tests)

③ SSR: Skin sympathetic response

## Neurogenic ED

aut

① Remove the Cause if possible

- Control DM
- # Alcohol
- Uremic Ht
- dis. agents

② Pharmacotherapy: Viagra

③ ICI → suitable for pts with irreversible nerve damage

but use lower doses why? denervation hypersensitivity causes exaggerated response.

④ Surgical Ht (i.e. Failed or Refused ICI)

• Penile Prosthesis.

• Semi rigid: useful in pts using catheter.



But Generally:

inflatable implants more suitable than semi rigid (to avoid erosion of implant).

⑤ Pharma  
5- VCD

Imp. SA

① Peyronie's dis. (PD) & penile deviation (1715 037) ① 57  
(penile fibromatosis; plastic induration) of penis

dis. char development of fibrotic plaques in the Tunica Albuginea of corpora cavernosa usually on the dorsal aspect & may extend to the lat. & vent. aspect.

NB → penile fibrosis: is a fibrotic process that involves the corporeal erectile tissue.

AET → theories: Cong. Traumatic Infective Neoplastic Miscellaneous  
2A  
↓ VDE

① Cong. + FH ± in 2%  
(AD inheritance postulated)  
↑ incl. of HLA A1 B27 OQW

Ass. Cong. Familial Abnormalities of Fibrous Tissue formation:

↑ tendency to keloid  
↑ tendency for scarring  
Scarring of plantar fascia → Ledershoe dis.  
Scarring of palmar fascia → Dupuytren's dis.  
Tympanosclerosis

② Traumatic (Most Accepted)

Repeated minor trauma during excessive or vigorous intercourse  
or Microtrauma ICI VCD  
Dupuytren's dis. see pathogenesis.

③ Infective: (Not accepted)

④ Neoplastic: Some cases ± Ass. e. Carcinoma  
Synd → ↑ Sentinel level → ++ Fibrous tissue formation

⑤ Miscellaneous: ass. dis. + (Risk Factors)

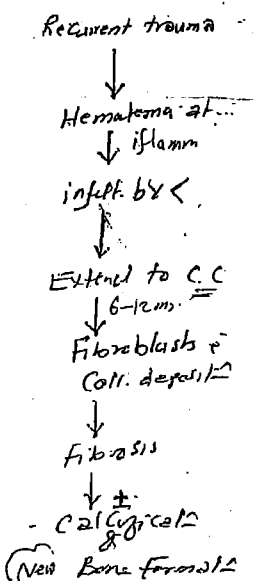
Aging  
DM  
Arteriosclerosis  
Autoimmunity  
Atherosclerosis

Drugs → barbiturates  
BB

⑥ VDE has Anti-fibrotic defect

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e < Lymphocytes & infilt.  $\rightarrow$  Fate



may resolve in  
Cms.

may extend  
from tunic to  
adjacent perile  
cavernous tissue.

6-12 ms)

Fibroblasts replace the inflamm. cells  $\rightarrow$   
 $\uparrow$  Collagen deposit  $\rightarrow$  Fibrosis & fibrous  
 plaque formation.

Calcificat &/or bone format may occur

Emmett 2011

NB phases of 1st

① Alut:  $g = 24 \text{ ms}$ :

- Pain
- Some Cervical
- Penile Nodule

② Chr.  $> 24m$ .

- ✓ Stable plaque
- ✓  $\pm$  Calcification
- ✓ Curvature, ED

Changes include:

- ①. ↑ Br III Cell. > Type I in <  $\frac{\text{Tunica}}{\text{C.C}}$  &

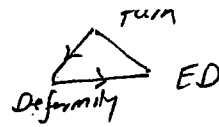
(also Type III ↑↑  
in VED)

- (2). upregulation of TGF- $\beta$  & Fibrin (TGF- $\beta$   $\rightarrow$  Tissue repair & scar formation)

- (3). ↓ Elastic fbs:

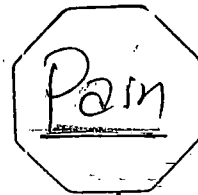
- ④ ↑ ROS

CIP

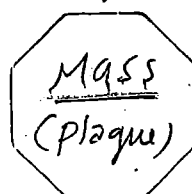


onset: either

- Most Cases: pain → feel a lump → Deformity
- Few Cases: report penile curvature that occurs over the night (suddenly) & remains stable

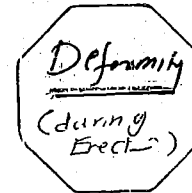


- during early stages (3-4ms) → relieved by fibrosis.
- During Erection



- > 1.5 cm
- Asympt
- midline; usually dorsal > ventral

NB. May precede the Deformity



Types

① Curvature (commensurate)

- upward: in dorsal effect
- downward: in ventral "
- Lat: in lat effect
- [deviate Towards the plaque]

① Arteriogenic: d.t. ass. vascular dis, HTN, DM & Asth.

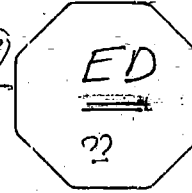
② Venogenic ?? (see VED)   
 *upward tunica*

③ Neurogenic: dorsal Nerve affect

④ difficult intromission (p)   
 d.t. curvature (if > 30°)

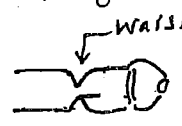
⑤ lost rigidity: distal end flaccidity (Flail Penis)

⑥ Psychogenic: d.t. shortening > curvature → performance anxiety.



② Hour glass deformity = flail penis: circumferential affect → flaccidity of distal end (glans)

③ Shortening (Psychogenic ED)



DD (A) penile deviate

- Cong.
- Chordee & Hypospadias
- urethral Manipulat<sup>n</sup> synd

Ventre deviate d.t. Fibrosis & any urethral manip.

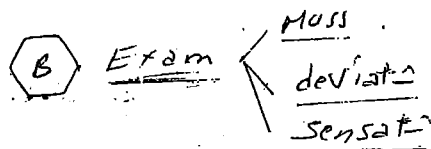
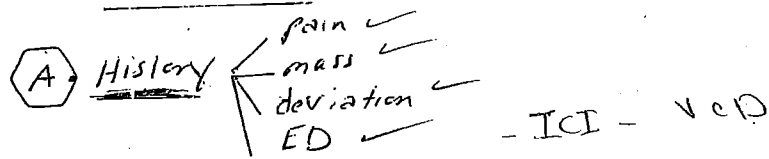
(B) penile Mass

- Trauma
- Tm
- Gumma

# Diagnosis of PD

(بداية) (ش)

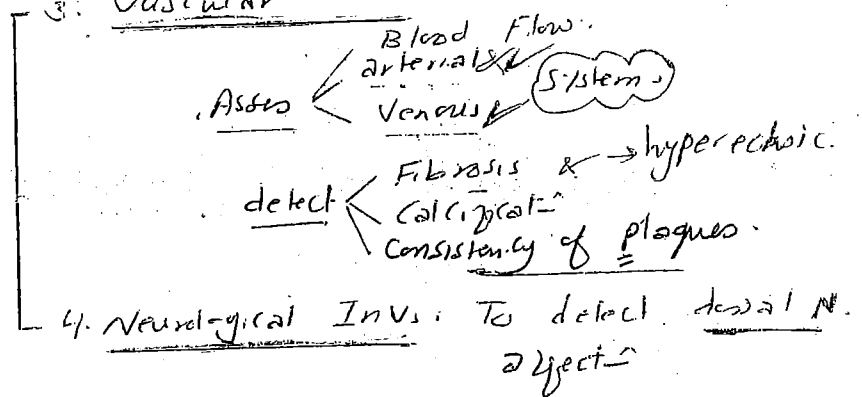
75 P. 60



## C. Inv.

1. ICI   
 diff. bet organic & psych.   
 detect the deviation (curvature).   
 2. Rigiscan   
 as ICI   
 Essential before M

## 3. Vascular Inv. (PPUD):



5. X Ray → Calcification (Indication of Surgery)

6. MRI : Preoperative Visualization of the anatomy.

# Treatment of PD

29 (BASIC) ICD 10  
 • avoid surgery  
 < 2y for chance of spont. resol.

## Medical indications

1. 1st 2 Ys (Acute or unstable dis)
2. Mild pain
3. Mild deformity (Angulation  $> 30^\circ$ )
4. Uncalcified plaques
5. No ED (NL rigidity)

NL intramission during Coitus.

## Surgical

- ① > 2 Ys (Chr. stable)
- ② Severe pain
- ③ n deformity ( $> 30^\circ$  angulation)
- ④ calcified plaques
- ⑤ ED

## A Medical Ht we use ( $\geq 6ms$ )

### Oral

- ① Tamoxifen (20-40mg 3ms)   
 Antiinflamm.   
 Antifibrotic   
 little efficacy
- ② Colchicine: Antifibrotic (0.5-2.5 mg/d)   
 Effective   
 Low cost (600-800 mg/d)   
 little efficacy
- ③ VITE (Vitamin E) (600-800 mg/d)   
 Effective   
 Low cost   
 little efficacy
- ④ NSAIDs - Indomethacin
- ⑤ PotABA (K. Panaminobenzoate)   
 Antifibrotic   
 ↑ tissue oxygenation   
 ↓ MHO enz.   
 ↑ Cap's size   
 ↑ Succ. 3g   
 12g/d For 1 Year.   
 S.E → GIT upset.
- ⑥ Systemic CS

- ① CCB (Verapamil)   
 10mg diluted in 10ml & injected   
 2w for 12 infs.   
 acute & chr. dis

No dose.

- ② Collagenase   
 useful in minimal deformity

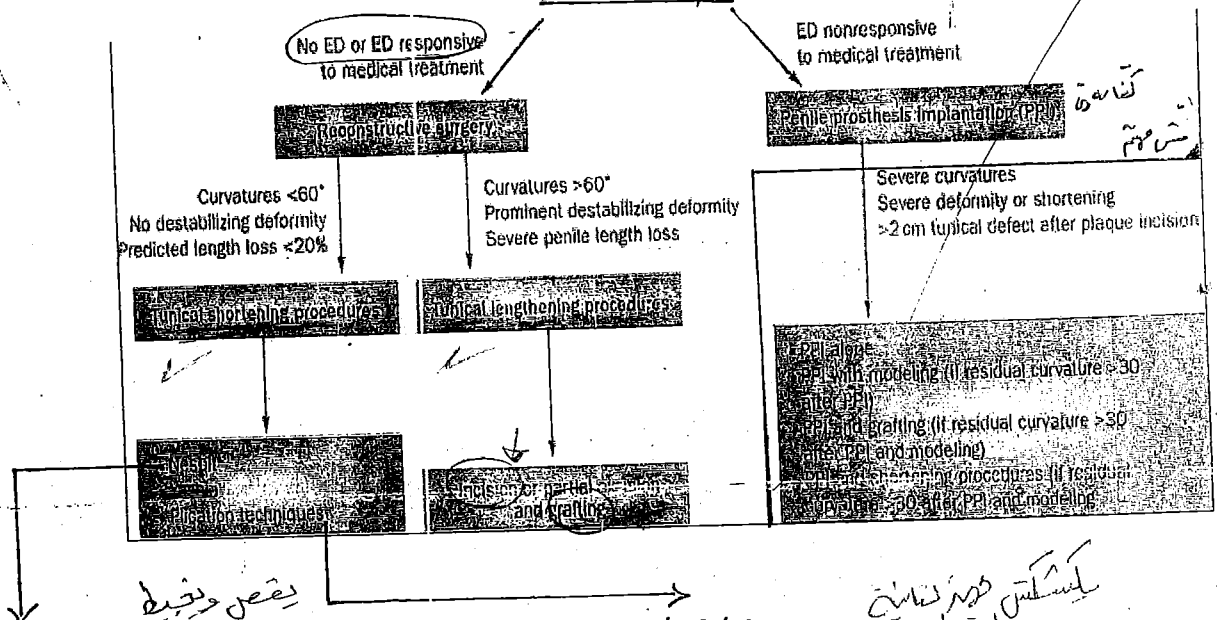
- ③ CS: C.I as → Betamethasone   
 atrophy & death of healthy tissue   
 + pain.

- ④ IFNα-2b 5x10<sup>6</sup> IU/w For 1y.

Surgical H

- ① > 2 Ys
- ② Severe Pain
- ③ Severe deformity ( $> 30^\circ$  angulation)  $\frac{\#}{\#}$   
Coital Intromission
- ④ Calcified plaques

look For Penile  
Rigidity (ED)



# ① Ellipse Excision of NL

Tunica opposite to  
the plaque  $\rightarrow$  Suturing

- adv . More potent
- long standing
- disadv . More Traumatic

# ② Plicato or Multiple Parallel Plicato Technique (MPP)

Multiple Parallel

Plical sutures done  
on opposite side of the plaque  
out tunical Excision.

- adv . Simple
- less traumatic
- disadv . less potent
- $\rightarrow$  penile Shortening.

3. Tunical Incision or partial Excision & autologous grafting.

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Minimal Excision or Simple release incision  $\rightarrow$  autologous grafting either from:

✓ Saphenous Vein

✓ Tunica Vaginalis

..... Dermis

✓ Buccal Mucosa

✓ Temporalis Fascia.

• Other lines of Ht -

① Radiotherapy

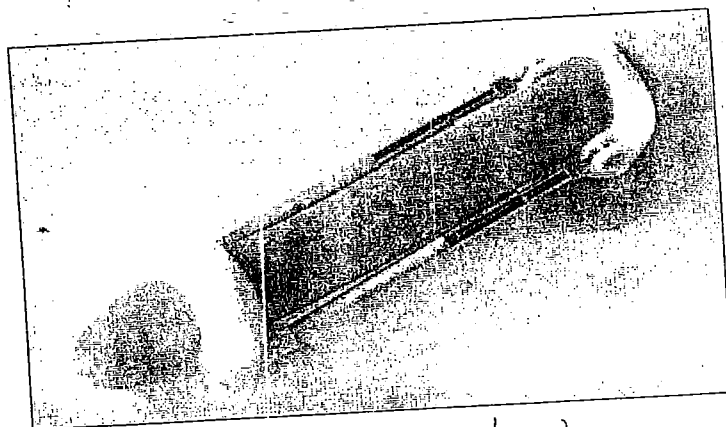
↓ Pain

S.E  $\rightarrow$  fibrosis

should be avoided in young age.

② Iontophoresis : Verapamil 10mg + 4cc Saline  $\rightarrow$  improve ! Pain & Curvature  $< 45^\circ$ .

③ Penile Tract Device : penile extender device  
used for 2-8 hrs/d for 6ms  $\rightarrow$  ↓ Curvature,  
Improve the length & girth



(Penile Extender)



# Priapism

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1

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Def. Persistent, AbNL erection that

lasts > 6 hrs  
> 4 hrs

Not associated  
sexual excitement  
or desire

not Relieved  
by masturbat

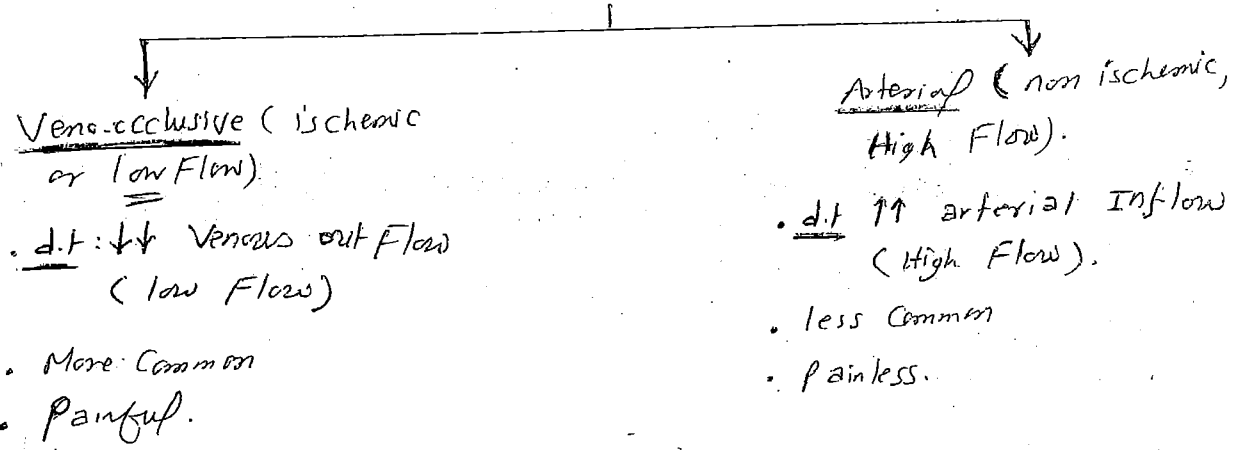
Priapism > 6  
Prolonged > 4

NB prolonged Erection: Sustained penile erection  
> 4 hrs → some authors treat it in < 4 hrs  
or 1 hr

Pathology of Priapism: (Affect only corp. cavernosa)

- > 6 hrs → ischemia & acidosis.
- > 12 hrs → destruction of sinusoidal endoth.
- > 24 hrs → Thrombosis
- > 48 hrs → complete Fibrosis & Necrosis.

Types of Priapism:



Causes of Veno-occlusive priapism (all → ↓ outflow)

1. AbNL prolonged smooth ms. relaxat<sub>n</sub> (Failed detumescence) of corpora cavernosa.
2. ↑ Bp. viscosity.
3. outflow obstruct<sub>n</sub>
4. other causes

Veno-occlusive priapism

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prolonged  
 ① Abnormal smooth muscle relaxation (of C. Cav.)

- ICI:  $\uparrow \uparrow \uparrow$ 
  - Neungenic ED  $\rightarrow$  exaggerated response to ICI
  - Papaverine alone (9.5%)  $>$  Bimix (4.3%)
  - $>$  PGs alone (2.4%)  $>$  Trimix.
  - $\downarrow$  incid. is  $\downarrow \downarrow$  in: pts using home injections (dlt adjustm. to suitable dose).

• Pharmacologic causes:

$\alpha$  antagonist  
 Prazosin  
 Hydralazine  
 CCB  
 Atenolol VD

- $\checkmark$  Anti hypertensives.
- $\checkmark$  Anti Coagulant  $\rightarrow$  Heparin & Warfarin
- (SSRI)  $\checkmark$  Antidepressants  $\rightarrow$  Trazodone, Sertraline, Fluoxetine, Lithium
- $\checkmark$  Anti anxiety  $\rightarrow$  Chlorazepate & Hydroxyzine
- (ART)  $\checkmark$  Androgens  $\rightarrow$  Replacetment in Hypogonadism
- $\checkmark$  Addictives  $\rightarrow$  Alcohol, Marijuana, Cocaine
- Others:
  - Hormones  $\rightarrow$  GnRH, Tamoxifen
  - Metoclopramide
  - meprobamate

• Neurologic disorders:

- CNS  $\left\{ \begin{array}{l} \text{Vascular dis.} \\ \text{Seizures} \end{array} \right.$
- Spinal  $\left\{ \begin{array}{l} \text{disc. (Lumbar)} \\ \text{Trauma} \end{array} \right.$

②  $\uparrow \uparrow$  Viscosity:

- Sickle Cell anemia
- Thalassemia
- Thrombocytosis
- AntiCoagulant withdrawal

## • Hemodialysis

- prostatic infection  $\rightarrow$  viscosity (local)
- Urethritis

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3 out-Flow Obst:

- penile Metastases
  - Leuk.
  - Lymphoma
  - MM
  - UT Tm.
- pelvic
  - Edema
  - Hematoma

4 Other Causes:

- ✓ Idiopathic ✓ common cause
- Cavernosography (if undiluted material used).
- Amyloidosis
- ✓ CO poisoning
- ✓ Malaria

Arterial Priapism (High Flow rate) → Mainly Traumatic

- ① penile or pelvic Trauma → Intra Cavernous arterial laceration
- ② After penile Revascularization
  - when inf. & pig. anastomosed to Corpora Cav. directly → high unregulated flow to them.

NB on Priapism

- ① ICI may lead to
  - venous priapism: d.t. failed detumescence Med
  - arterial " d.t. inj. to Cavernosus 2 by needle.

② Priapism aetiology:

- children → Blood dis. or Neoplasms
- Adults → ICI or Idiopathic

③ Stuttering Priapism: → Recurrent attack that is frequent, → intermittent

- usually High flow
- at first painless → then painful
- Risky pt sickle cell disc.
- SCD
- Past Hx of 1st Flow priapism

Repeated Partial Priapism may be 2y to:

- Sickle Cell dis
- Trauma
- Psychotropic agents

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α-adrenergic stimulants as Ephedrine can improve & prevent severe priapism.

### Diagnosis of priapism

0.551

Q. Management of priapism

	Veno-occlusion Priapism	Arterial P
<u>Incid.</u>	Common	less Common
<u>onset</u>	Acute	gradual
<u>Pain</u>	+ve (ischemia)	±ve (no Ischemia)
<u>Rigidity</u>	Marked	less
<u>Aspirated</u>		
<u>ASP. Blood</u>	venous like (dark red) (↓ PO <sub>2</sub> )	Arterial (Bright red) (↑ PO <sub>2</sub> )
<u>PPDU</u>	↓ PSV, dark syst. ven.	↑ PSV
<u>Cavernosography</u>	↓ venous Flow	NL
<u>Prognosis</u>	Poor if Ischemia	Good

### LAB INVEST.

CBC → Anemia, leukocytosis & Thrombocytosis

BG → To diff. bet 2 types of priapism & to detect toxicity

Blood Gases

Penile duplex & Pelvic Angio

detect fistula (in arterial type)

CXR if Hx

Mg Metastases

NL arterial blood at room Temp.

NL mixed venous BP.

Non-Ischemic

Flaccid penis

PH: 7-4

PH: 7-35

PO<sub>2</sub>: > 40

PO<sub>2</sub>: 40

PCO<sub>2</sub>: < 40

PCO<sub>2</sub>: 50

(any)

(NB)

Blood Gases

Ischemic Type

PH: < 7.25

PO<sub>2</sub>: < 30 mmHg

CO<sub>2</sub>: > 60

## Treatment

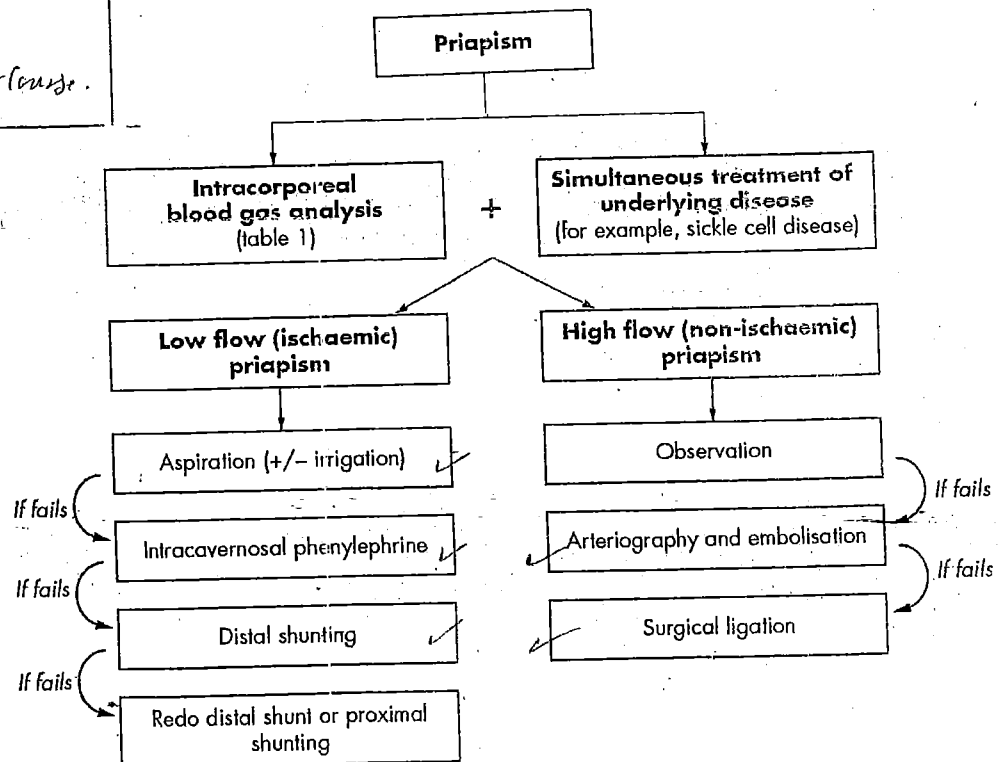
- (1) low flow priapism
- (2) High flow "
- (3) Stuttering priapism
- (4) SCD associated "

### A Case of Priapism

#### Simple Measures

- Analgesics & anaesthetics for pain
- Exercise
- Ice back
- Masturbation
- Sexual intercourse

- Patient History  
 Physical Exam.  
 Corporal aspirate & Blood Gas  
 assessment  
 • INV  
 • PDU



NB

Low Flow IH

1. 1st line: Aspiration +/- irrigation → relieve priapism in 35%  
 (علاج أولي) سحب الدم +/- الري
2. 2nd line: IC Phenylephrine injected same amount of saline  
 (علاج ثانوي) حقن الفينيليفرين في التجويف مع كمية متساوية من المحلول

• phenylephrine [ Sympathomimetic ]

الابنول اصل ← ... سكرول جام (ايم)  
 1-5 = ← سيف 21 : سكرول اصل ريفيد م 1-1/2  
 كل 5-10 دقائق بعد اقفان اجيم [ مراء سيفيد اصل او ايرل  
 سيفيد م 1/2 ]

Precautions  
 Risky pt ← Cardiovascular dis.  
 Extreme of Age.

Monitor : BP & pulse

S.E : Headache ✓ Tachycardia  
 HTN ✓ reflex bradycardia  
 dizziness ✓ Arrhythmia.

if failed do shunt operation →

3. Stuttering Priapism:

Hair  
 A. Antiandrogen ← -- product : Ketoconazole  
 -- release : GnRH agonist  
 -- Rs : CYP450 cyproterone acetate  
 ↓  
 Orate

B. Etileferine (α agonist; 25-100 mg 3x)

C. Baclofen :  
 GABA agonist inhibitory neurotransmitter  
 40 mg / d.

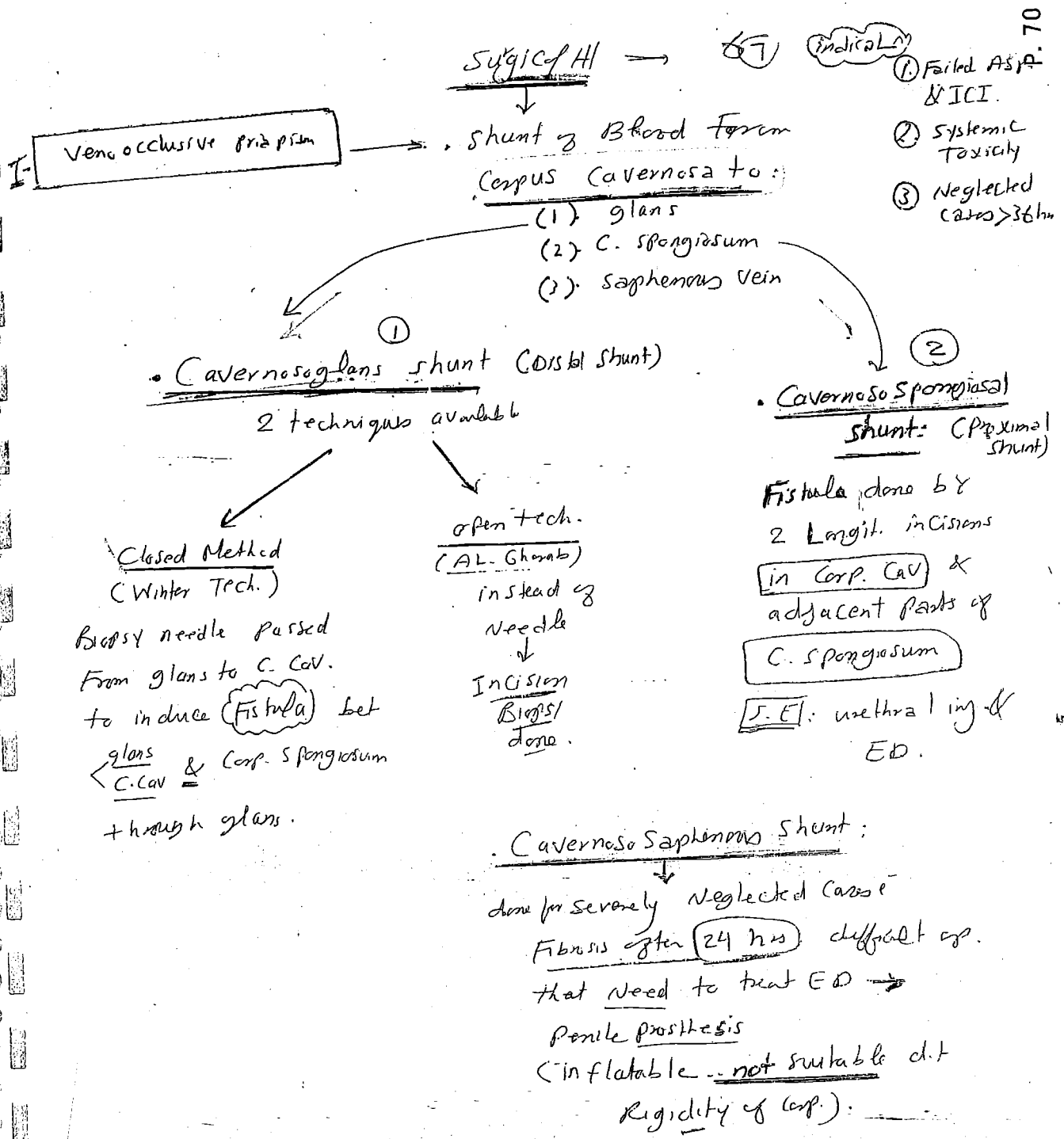
D. PDE-I : ~~phosphodiesterase~~  
 Viagra Sildenafil (25-50 mg 1d) or Tadalafil (5-10 mg, 1d)  
 سبي سبي سبي سبي

شرط انتقاله من سبي  
 Priapism.

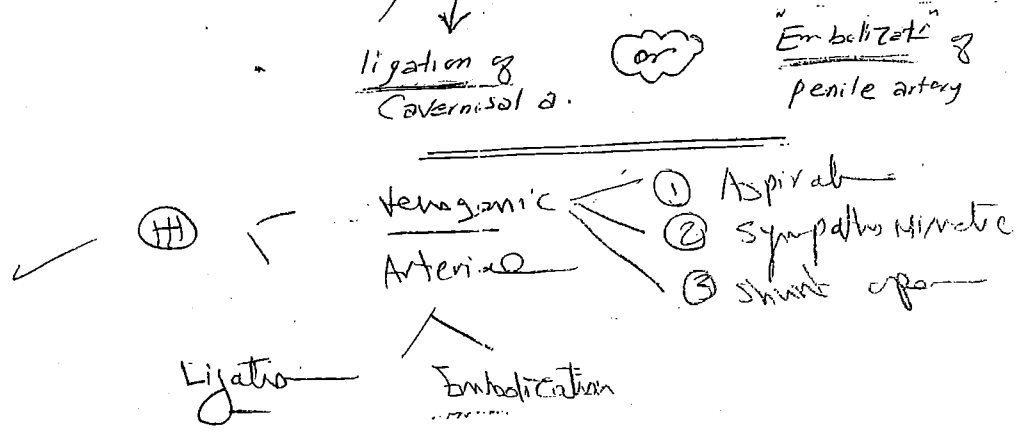
E. Others :  
 Digoxin  
 Ketoconazole + Prednisolone (J Uro; 2009)

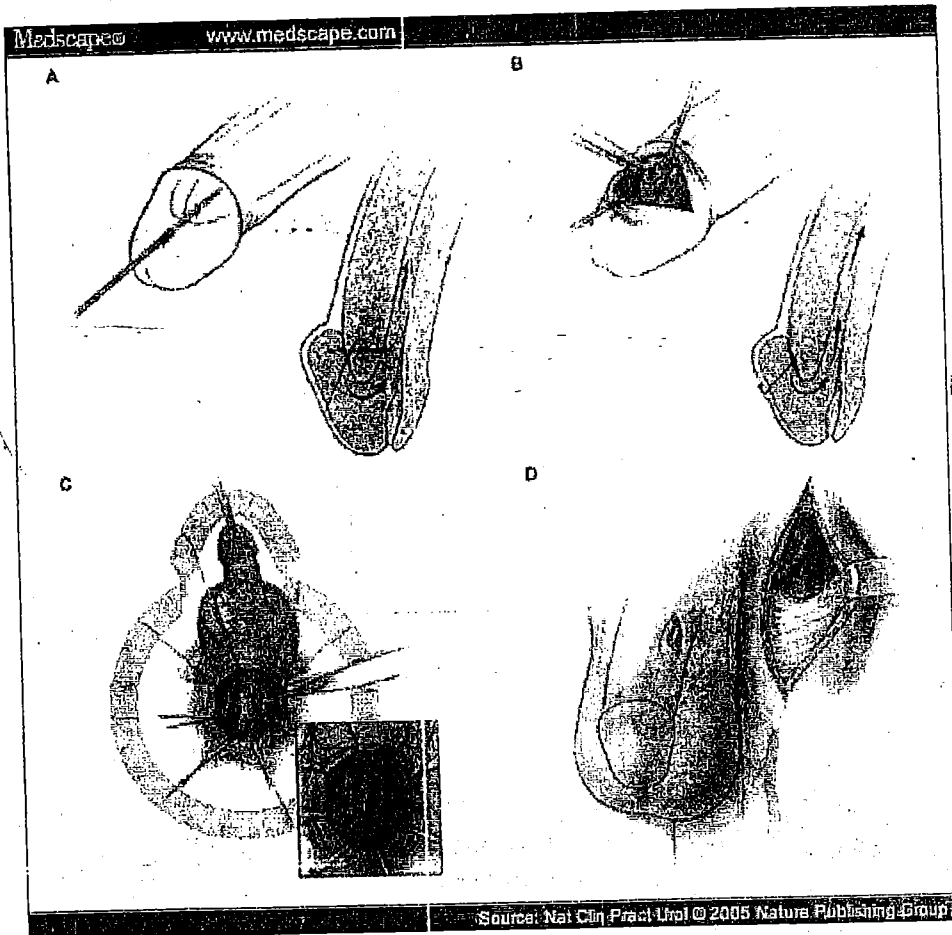
4. Sickle cell dis. ass. Priapism:

oxygenate  
 Hydralazine  
 Afkalimzole  
 Analgesics (Morphine)  
 Exchange Transf. :  
 ↑ Hct > 30%  
 Hbs < 30



## II Arterial priapism





Surgical shunts for the treatment of priapism. Distal cavernoglanular (corporoglanular) shunting is represented as (A) Winter and (B) El-Ghorab shunt procedures. Proximal cavernospongiosal (corporospongiosal) shunting is represented as (C) Quackels/Sacher and (D) Grayhack shunt procedures. Images drawn by David Fini and reproduced with permission from © (2005) Johns Hopkins University.



## Penile Fracture & Trauma

(Fractured penis & Penile rupture)

(nbo)  
77

def. rupture of Tunica Albuginea of Corpora cavernosa when the penis is in a fully Erect state.

Etiology: d.t. sudden Blunt trauma or Abrupt lateral bending of penis when its Erect & Cause breaking of the markedly thinned & Stiff Tunica → Fracture  
↓ at (3, 9 o'clock)

Trauma may occur d.t.

(30%) → 1. Most Common: during Sexual intercourse while in Female Superior position when penis Slips out of the vagina & strikes Perineum or S.P

2. Rare Causes:


- ✓ Industrial Accidents
- ✓ Tough masturbation
- ✓ Gunshot wounds
- ✓ Applying clothes when Penis is Erect
- ✓ Mechanical Trauma → aggressive breaking of Erect penis.

- CIP
1. Sudden onset of Sound: Popping, Cracking (and snapping) & detrusor (28)
  2. Pain: minimal - severe sharp Pain acc. to degree of injury
  3. Hematuria: If there is urethral injury.
  4. Urine retention: If urethral injury or perineal Hematoma causing BVO.
  5. By Examination: (Eggplant deformity):

penis is  
 • Curved  
 • deviated (away) from site of tear 2x4  
 To mass effect of Hematoma

penis is  
 • 3.9  
 • 6 (Rare)

Deformity



Swelling

- localized clot over the site of rupture is felt as firm discrete mass over the penile skin can be rolled [rolling sign]

Ecchymosis

If Buck's Fascia

Intact

Ecchymosis confined to shaft

Ruptured

Ecchymosis contained in Colles Fascia

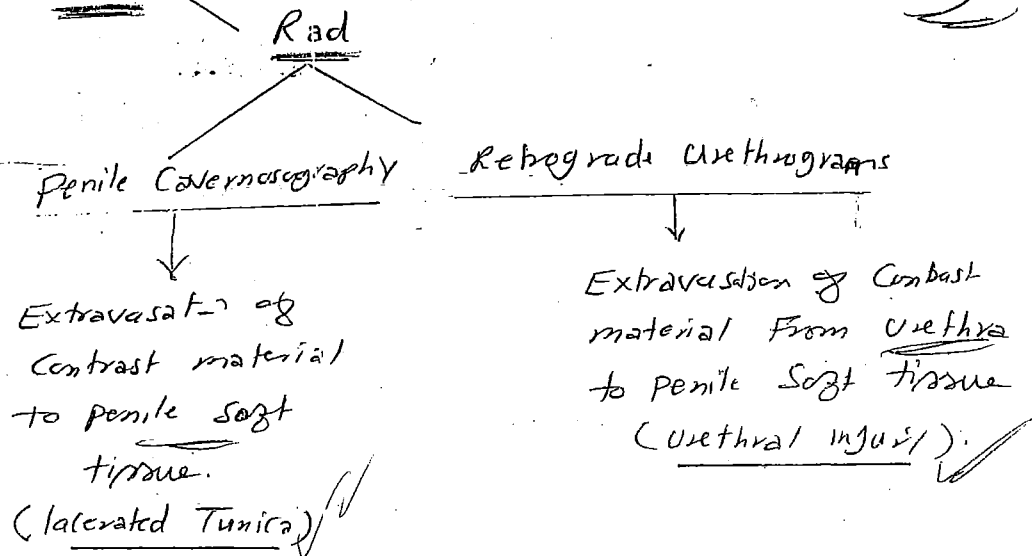
"butterfly pattern"  
 Ecchymosis over perineum, scrotum, lower abd. wall

Also → ± Tenderness.

(79)

Diagnosis:

- History
- Examination
- Inv  $\left\{ \begin{array}{l} \text{lab: Microscopic Hematuria on Urine analysis.} \\ \text{Rad} \end{array} \right.$

Treatment

دکتر مسعود

Surgical Reconstructive Surgery

- درمان:
- Cold Compresses
  - pressure dressings
  - Anti-inflammatory medications.

Course & prognosis: with prompt D & Expedient Surgical management  $\rightarrow$  Excellent outcome.

Complications $\rightarrow$  ED ?

- ED
- Pain
- fibrosis
- Fistula

- Cavernosospontaneous shunt (Fistula) &
- ABNC Curvature
- Parigul Erect
- Penile abscess
- urethro-cut fistula.